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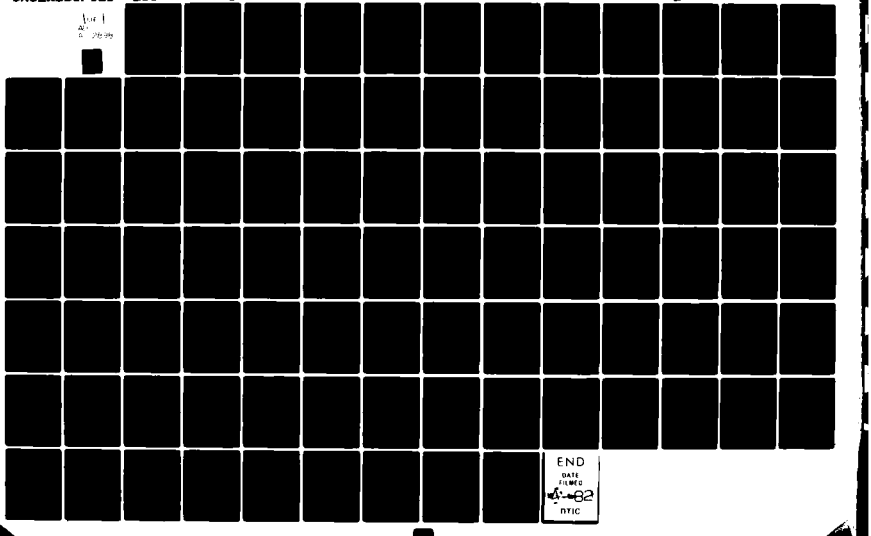

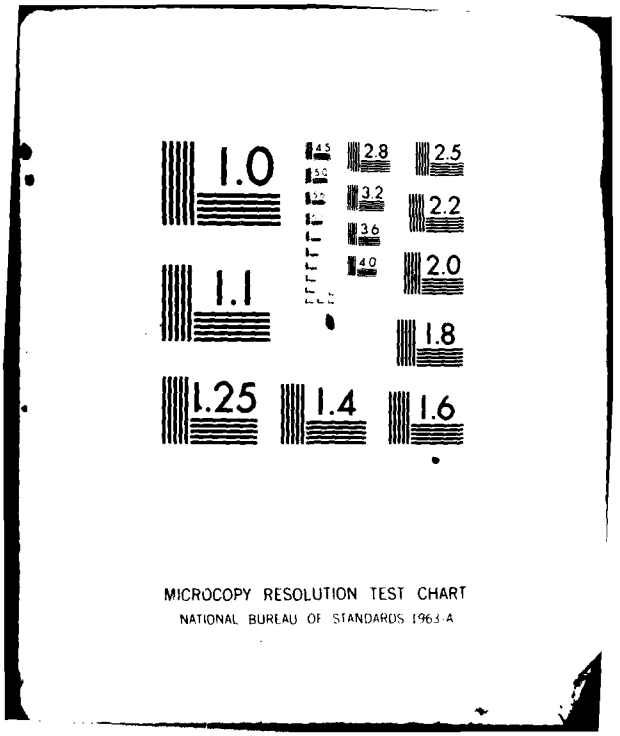
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LSI TR-477-19B

MAMMALIAN TOXICOLOGY TESTING: PROBLEM DEFINITION STUDY

CAPABILITY MODULES (U)

by
R. A. Wynveen, R. V. Alban, R. J. Davenport,
J. P. Glennon, G. E. Schiefer and R. H. Reuter

April, 1981

Supported by

U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND
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Contract DAMD17-81-C-1013

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Information on the areas and laboratories that make up a full service capability facility for Applied Mammalian Toxicology Research/Testing are summarized in this report. The areas and laboratories required, called modules, were sized as a minimum increment for the capability or service being incorporated into the module. Sixty-three different modules were identified. Information includes floor plan, construction information, special assumptions, special features/benefits and cost estimate.

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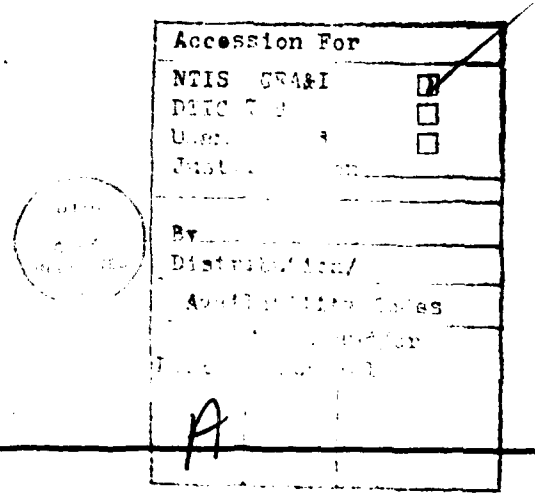
Report Subtitle	Life Systems, Inc. Report Number
Final Reports--	
Part 1. Comparative Analysis Report	LSI-TR-477-2
Part 2. Facility Installation Report	LSI-TR-477-3
Part 3. Impact of Future Changes Report	LSI-TR-477-4



FOREWORD

Reports for this Contract, DAMD17-81-C-1013, consist of three major final reports and twelve supporting documents. The Contract title, MAMMALIAN TOXICOLOGY TESTING: PROBLEM DEFINITION STUDY, is the main title for all the reports. Individual reports are subtitled and referenced with Life Systems, Inc. report numbers as detailed below. Please note that the Life Systems report numbers in test references are shortened. In the Defense Technical Information Center (DTIC) data base the reports are identified by the complete report numbers (i.e., LSI-TR-477-XXX) and complete numbers must be used for retrieval.

Report Subtitle	Life Systems, Inc. Report Number
Final Reports--	
Part 1. Comparative Analysis Report	LSI-TR-477-2
Part 2. Facility Installation Report	LSI-TR-477-3
Part 3. Impact of Future Changes Report	LSI-TR-477-4
Supporting Documents--	
Technology Changes Impact on Testing Requirements	LSI-TR-477-14
Quality Assurance Plan	LSI-TR-477-17A
Capability Modules	LSI-TR-477-19B
Technical Plan	LSI-TR-477-20A
Equipment Plan	LSI-TR-477-21A
Personnel Plan	LSI-TR-477-23A
Inhalation Chambers and Supporting Equipment Survey	LSI-TR-477-26A
Equipment List for Modules	LSI-TR-477-28B
AMTR Protocol/Pricing Report	LSI-TR-477-29A
Global Army Toxicology Requirements	LSI-TR-477-31A
Comparison Toxicology Test Costs	LSI-TR-477-36A
Annual Testing Capacity	LSI-TR-477-38A

SUMMARY

An important part of meeting the U.S. Army's requirements for applied mammalian toxicology research & testing is the development of the Facility in which the work will be carried out. A goal for the Facility was to ensure it could provide a full service capability.

The planning efforts completed had objectives that included providing conceptual and detailed plans that would accommodate the types of tests required by the Army. This included ensuring the results would be applicable to a range of Facility sites and time frames. Of particular importance would be a time frame varying from the immediate to ten or more years in the future.

Of the many assumptions used, a major one was not to design the Facility for a specific capability, capacity or site. Further, to include scientific, supporting and business administration areas. It was recognized early that no set amount of Facility area, construction budget or time to start-up would be specified.

Toxicology involves more than production testing or applied research. The planing efforts did not include focusing on basic toxicology research, personnel training in toxicology, etc. It did, however, look at the types of services needed before testing was initiated, the testing itself, activities carried out in parallel with testing, and activities needed after the testing was completed.

Three categories of tests were identified: (1) General Toxicology Tests; (2) Genetic Toxicology Tests; and (3) Special Scientific Toxicology Tests for Studies.

Supporting services were divided into two categories: the permanent support services and those considered available outside of the Facility through a contract mechanism. Thirteen areas were identified in the former case and 9 in the latter.

A modular concept was used as the approach to design flexibility and to establish capability option. This will enable the Army's decision-makers the greatest latitude in selecting the final capability. The modular concept selected was not, for example, a defined modular size with all rooms based on being a multiple of this size nor a module built-off site and delivered pre-assembled to the Facility.

The benefit to the Army is that had one design been developed, it would have been site specific. The approach used will allow the architect to sit with each expert or group of personnel who will use a given Facility module to evaluate and arrive at what is needed in the module. The modular concept also avoided the errors of leaving out areas or laboratories because of a failure to look at all the "pieces".

Sixty-three toxicology Facility modules were identified and divided somewhat arbitrarily into four areas: (1) Areas of most importance; (2) areas of immediate importance; (3) areas of minor importance; and (4) facility central utility areas. The number of modules in each of these areas were 23, 12, 15 and 13, respectively.

For each of the 63 modules a description was prepared. It provided information in five categories including floor plan, construction information, special benefits to the Army, special assumptions and a cost estimate. The latter was divided into general construction, heating ventilation and air conditioning, electrical, sanitary, and equipment costs.

Prior to and during the design of the 63 modules, certain general specifications and general assumptions were used and made, respectively. These are important in establishing what was or was not considered in developing the modular designs.

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INTRODUCTION

A program has been undertaken to study and define the U.S. Army Medical Research and Development Command's (MRDC's) requirements for Applied Mammalian Toxicology Research/Testing and methods for meeting the requirements. Inherent in the latter is the consideration of the facility, equipment and expendables, personnel, quality assurance, and resources needed for the design, construction and operation of such a facility. The Mammalian Toxicology Facility Capabilities Modules Problem Definition Study (Study) was completed as a part of this effort.

Scope of Document

The present document was conceived and prepared to accumulate in one spot information on the areas and laboratories that make up a full service capability facility for Mammalian Toxicology Research/Testing. This will be referred to as the Facility in this report. The required areas and laboratories have been called modules. Each was sized to what is considered to be a minimum increment for the capability or service being incorporated into the module.

Objectives

The objectives of the Facility planning efforts included:

1. Provide conceptual and detailed plans for a Facility to accommodate the types of tests required by the Army.

2. Select an approach that would make the results applicable to a range of Facility sites and time frames. The time frames might vary from immediate to ten years or more in the future.

3. Provide a basis for pricing the selected Facility: construction, heating, ventilation and air conditioning (HVAC), electrical and sanitary services.

4. Provide a basis for calculating capacities of testing as a function of floor plan/area.

Assumptions

The assumptions used on the Facility's planning included:

1. The Facility was not to be designed for a specific capability, capacity or site.

2. Characteristics of the Facility were to include scientific, supporting and business administration areas.

3. No set amount of Facility area, construction budget or time to startup was to be specified.

4. An airlock/anteroom was used in preference to a pressure zone or clean dirty corridor concept because:

a. Most times the contaminant in the room is worse than in the corridors, but sometimes it is reversed. With a fixed pressure differential system, no flexibility exists to handle such an occurence.

b. It has been found that initially established pressure differential relationships change with time as a function of a broad range of very hard to control factors. Thus, the high-to-low pressure protection assumed during the design phase often disappears or even reverses itself sporatically or permanently after certain events in the operational phase.

FULL SERVICE CAPABILITY

As noted in the Comparative Analysis Report (Life Systems, Inc. 1981a), toxicology involves more than production testing or applied research. Efforts focused on the Facility did not include, for example, basic toxicology research or personnel training in toxicology. Although these are important portions of toxicology, they were not included in the Study's scope.

A full-service mammalian toxicology facility would include services provided:

1. Before the testing was initiated.
2. During the testing itself.
3. As activities carried out in parallel with testing.
4. After the testing was completed.

The Comparative Analysis Report provides a detailed description of the broad range of toxicology tasks associated with each of these four areas of toxicology.

Incorporated Capability

The added Army toxicology capability reflected in this Facility Capability Modules Report will provide a capability to meet a portion of the Army's requirements typically expected to be provided by the MRDC.

Deleted Requirements

Of the global Army requirements, several were deleted from being incorporated into the facility capability planning. The deleted requirements included:

1. Toxicology requirements associated with drug and vaccine developments.

2. Toxicology associated with offensive chemical warfare (an area of technology in which the MRDC has no involvement).

3. Toxicology associated with defensive biological warfare.

4. Toxicology associated and grouped as part of larger Army program activities:

    a. The toxicology involved in Occupational Health.
    b. The toxicology involved in Health Hazard Assessment (HHA).

5. Toxicology associated with nuclear warfare.

6. Basic toxicology research.

7. Training of Army-required toxicology personnel.

Epidemiology

Although there is growing advocacy for employing epidemiological techniques in human health effects investigations and we will probably see increasing focus on the use of epidemiology in the future, it is not included as part of the Army's toxicology requirements.

Types of Tests

There are three major areas that must be considered when evaluating toxicology testing. These tests are needed to determine:

1. Physical/chemical properties of the chemical, the chemical and its use, the environment created by use of the chemical, etc.

2. Health effects.

3. Environmental effects.

Health effects toxicology was included in the Study, but environmental effects were not. However, merit exists in grouping all of the MRDC's/Department of Army's (DA's) toxicology requirements together. The measurement of the physical/chemical properties of a toxic or potentially toxic chemical or mixture can be included as an activity done before testing or as part of testing. For the present Study, it was included as part of the testing activities.

Capability and Capacity of Selected Facility

The actual capability and capacity included in the new facility (new meaning newly built or a renovated site) remains to be determined and is an MRDC/DA decision. The Facility can be full service or limited service. The services can be applied to a number of specific toxicology research/testing capabilities.

TYPES OF TESTS NEEDED

Providing for the MRDC's unmet toxicology requirements resulted in the identification of three categories of tests. The tests include those required to be compatible with global Army requirements. The three categories of tests include:

1. General Toxicology Tests.
2. Genetic Toxicology Tests.
3. Special Scientific Toxicology Tests (Studies).[a]

(a) For the remainder of the report the special scientific toxicology tests will be referred to as studies. This is done to reflect the research orientation of these activities.

General Toxicology Tests

Table 1 presents a list of 19 types of Army mammalian toxicology tests. These resulted from a survey of all known types of mammalian toxicology test descriptors which were then reduced to a list of those most likely to be applicable to the Army's requirements. This was followed by an identification of specific protocols for each of the group of 19 tests (Life Systems, Inc. 1981b).

Genetic Toxicology Tests

Table 2 describes five genetic toxicology tests which could be incorporated into the Facility's capability.

Special Scientific Toxicology Studies

The toxicology research/testing capability envisioned as able to be incorporated into the Facility include the following:

1. Behavioral Studies.
2. Metabolism/Pharmocokinetic Studies.
3. Pharmocodynamic Studies.
4. Oncogenic Studies.
5. Respiratory Physiology Studies.
6. Reproduction Studies.
7. Teratology Studies.
8. Neurotoxicity Studies.

The Facility has been designed so that each of these eight toxicology studies has separate testing facilities. This enables more detailed investigations than would be included under general toxicology testing.

SUPPORTING SERVICES CAPABILITY

The support services business area was subdivided into two divisions: Permanent Division and Support Services Division. The former are considered services that are not readily accomplished external to the Facility. Those considered to be able to be purchased on the outside were grouped in the Support Services Division. One additional source of services could be obtained through the host Government facility itself.

Permanent Support Services

These are services which are difficult, very inconvenient, or impossible to have done under contract outside the Facility. This group includes the following:

1. Oral Exposure Areas
2. Inhalation Exposure Areas
3. Dermal Exposure Areas
4. Ocular Exposure Area
5. Animal Quarantine Area
6. Food Preparation/Blending Area
7. Refrigerated Food Storage Area

TABLE 1 SPECIFIC TYPES OF ARMY MAMMALIAN TOXICOLOGY TESTS

No.	Duration		Type of Animal	Route of Exposure	No. of Species	Outcome[a,b]
	General	Specific				
1.	Acute	Short	Rodent	Oral	1	General Toxicology
2.	Subchronic	90-Day	Rodent	Oral	1	General Toxicology
3.	Chronic	Life-Time	Rodent	Oral	1	General Toxicology
4.	Acute	Short	Rodent	Inhalation	1	General Toxicology
5.	Subchronic	X-Day	Rodent	Inhalation	1	General Toxicology
6.	Chronic	Life-Time	Rodent	Inhalation	1	General Toxicology
7.	Acute	Short	Primate	Inhalation	1	General Toxicology
8.	Subchronic	90-Day	Primate	Inhalation	1	General Toxicology
9.	Chronic	Life-Time	Primate	Inhalation	1	General Toxicology
10.	Subchronic	90-Day	Dog	Oral	1	General Toxicology
11.	Acute	Short	Rabbit	Dermal	1	General Toxicology
12.	Subchronic	Z-Day	Rabbit	Dermal	1	General Toxicology
13.	Acute	Short	Rabbit	Ocular	1	General Toxicology
14.	Acute	≥21 day	Chicken	Oral	1	Neurotoxicity
15.	Subchronic	90-day	Chicken	Oral	1	Neurotoxicity
16.	Acute	Short	Rabbit	Dermal	1	Irritation
17.	Subchronic	90-day	Rabbit	Dermal	1	Irritation
18.	Acute	Z-Day	Rabbit	Ocular	1	Irritation
19.	Acute	Short	Rodent[c]	Dermal	1	Sensitization

(a) Efficacy would be included for drugs and vaccines.
(b) General toxicology includes lethality and metabolism/pharmacokinetics plus minor investigations of the several other toxicology disciplines (e.g., pharmacodynamics).
(c) Guinea Pig

TABLE 2 GENETIC TOXICOLOGY TESTS

A. Standards for Detecting Gene Mutations

1. Detection of Gene Mutations in Bacteria
   - The *Salmonella*/Microsomal Assay
   - The *Escherichia coli* WP2 and WP2 *uvrA* Reverse Mutation Assay
2. Detection of Gene Mutations in Eukaryotic Microorganisms
   - *Aspergillus nidulans*
   - *Neurospora crassa*
3. Detection of Gene Mutations in Insects
   - *Drosophila melanogaster* Sex-Linked Recessive Lethal Test
4. Detection of Gene Mutations in Somatic Cells in Culture
   - Mammalian Cell Culture — L5178Y Mouse Lymphoma Cells
   - Mammalian Cell Culture — V79 Chinese Hamster Cells
   - Mammalian Cell Culture — Chinese Hamster Ovarian (CHO) Cells
5. Detection of Gene Mutations in Mammals
   - The Mouse Specific Locus Test

B. Standards for Detecting Heritable Chromosomal Mutations

1. *In Vivo* Cytogenetics Test in Mammals
2. Detection of Heritable Chromosomal Damage in Insects
   - Chromosomal Damage in *Drosophila melanogaster*
3. The Dominant Lethal Test in Mammals
4. The Heritable Translocation Assay

C. Standards for Detecting DNA Repair or Recombination as an Indicator of Genetic Damage

1. Detection of Genetic Damage using DNA Repair-Deficient Bacteria
2. Unscheduled DNA Synthesis in Mammalian Cells in Culture
3. Detection of Mitotic Crossing Over and/or Gene Conversion in Yeast
4. Sister Chromatid Exchange in Mammalian Cells in Culture

D. Standards for Detecting Chromosomal Damage

1. *In Vitro* Cytogenetics Assay
2. Micronucleus Assay

E. Standards for Detecting DNA Alkylation

1. DNA Alkylation in *Drosophila melanogaster* Sperm Cells
2. DNA Alkylation in Rodent Sperm Cells
3. DNA Alkylation in Mammalian Cells in Culture

8. Waste Handling/Disposal Area
9. Cage/Rack Washing and Storage Area
10. Chemical Storage Area
11. Showers, Lockers and Toilets Area
12. Glass Washing Area
13. Linen Storage Area

Externally Purchasable Services

These support services are considered available outside of the facility under contract. This group includes the following:

1. Pathology Laboratory
2. Clinical Chemistry Laboratory
3. Animal Breeding
4. Veterinary Medicine
5. Chemistry Laboratory
6. Automated Data Processing
7. Radiochemistry Laboratory
8. Equipment Maintenance
9. Laundry

The Chemistry Laboratory Service can be further subdivided into analytical and synthetic.

Host-Government Facility Services

A total of 246 business services were identified that could be provided from the host Government Facility especially if the Facility were co-located with other activities within the same building (Life Systems, Inc. 1981b, p. 27). They were coded to include those which should be given serious consideration for being provided by the host Government organization (e.g., LAIR, if LAIR was the site of the added Facility), and those which could be considered good candidates for consideration (total of 40). Final selection depends upon MRDC's/DA's priorities, resources, requirements and capabilities addressed and the capacity incorporated.

MODULAR CONCEPT

A modular concept was used as the approach to design flexibility and to establish capability options available in finalizing the Facility's ultimate capability. This final capability will be determined by the Army's decision makers.

What The Modular Concept Is

The modular design is a means to an end. It was pursued during the Study because:

1. The research/testing requirements were not available at the Study's beginning to allow a specific design to be developed based upon one set of requirements. The timing did not allow a sequential approach consisting of: first, determining requirements; second, selecting those to be met within the Army's own facility; and third, designing a specific facility to satisfy those requirements.

2. Results of the comparative analysis were not available before the Facility's design had to be initiated. The results of the subsequent analysis demonstrated that certain testing should be done within the Facility while other testing could be done by organizations external to the Facility. The latter included other Army sites, other Federal Agencies and "for hire" laboratories.

3. The MRDC desired to consider multiple sites for locating the Facility. This was subsequently expanded to include the concept of one "facility" with capabilities located at various Army locations.

What The Modular Concept Is Not

The modular concept is different than modular construction. It is not, for example:

1. A defined modular size with all rooms based on being a multiple of this size, as is often architecturally done.

2. A module built off-site and delivered pre-assembled to the facility.

Why Selected

The modular approach was selected because:

1. Testing requirements were unspecified and unknown.

2. Multiple sites were viable options, making a specific design subsequently inflexible for any other site.

3. Development work could be done simultaneously on the three major program end-item deliverables:

   a. Comparative Analysis Report (including the requirements definition)

   b. Facility Installation Plan (including equipment, facilities, personnel, quality assurance and resources plan)

   c. Future Research Report (including the impact of changes in technology and regulations).

4. Greater focus could be put on the details of each module. Without the modular approach this would normally have been excessively complex.

5. It allows voicing the individual "functional" capabilities as entities in themselves before finalizing an overall facility architectural layout. The standard approach leaves little flexibility for users of the space to modify the areas and laboratories they will use to suit their needs. This is because architectural decisions made on floor areas, ceiling heights, location of elevators, location of stairways, duct work, etc. all are made without adequate Facility user inputs.

Approach

The modular approach divided the Army's projected Mammalian Toxicology Research/ Testing Facility into a series of 63 areas/laboratories. When assembled in an integrated manner, these areas/laboratories and the correct number of each, will provide the capability and capacity to carry out that portion of the Army's requirements it elects to have done in the Facility. Further, it will allow testing of the 19 specific types cited in Table 1, the genetic toxicology testing cited in Table 2 and the eight types of Special Scientific Toxicology Studies (listed on page 8 of this report).

The approach was to develop a set of assumptions, features or benefits and specifications for each area or laboratory. Then a cost was determined. It was based on the various elements of construction costs and the equipment to be incorporated in the module.

Benefits

Had one design been developed, it would have been site specific. The use of the modular concept enables the capability reflected by the module, or multiples of the modules, to be arranged and rearranged to best fit the particular site or sites being considered by the Army.

Another major benefit is that the architect can sit with each expert or group of personnel who use a given module to evaluate and arrive at what is needed in the module. In other instances where this type of planning is not used, the expert or group of personnel might simply be told, "This is the space you have available and it's located over there."

The modular approach also enables the Facility to be designed to meet different testing combinations and qualities.

Finally, the modular concept avoids the errors of leaving out facilities because of failing to look at all the pieces. This often occurs when concentrating on a large, complex overall facility. Further, it is a method that will prevent re-inventing the services/functions/areas/laboratories which should be considered in a Mammalian Research/Testing Facility if the Army decides not to build now, but to delay and re-evaluate in the future.

MODULES

Sixty-three toxicology Facility modules were identified and arbitrarily divided into four areas:

1.	Areas of Most Importance	(23 modules)
2.	Areas of Intermediate Importance	(12 modules)
3.	Areas of Minor Importance	(15 modules)
4.	Facility Central Utilities Areas	(13 modules)
	Total	63 modules

With time, several additional modules will be found while some of the selected modules will be determined to be inappropriate. The group, however, is one of the most representative existing.

For each of the 63 modules a description was prepared (Form F-650) and these are contained in Appendix 1. This form provides information on the following five major categories:

1. Floor plan with dimensions and equipment locations (scale 1 inch equals 15 feet).
2. Construction information.
3. Special features or benefits.
4. Special assumptions (general assumptions are described below).
5. Cost estimate.

The construction information contained with each module's description varied from identification of air flow needed to type of fire-suppressing sprinkler system. The general specifications and assumptions are discussed below.

The cost estimate was divided into:

1. General Construction.
2. Heating, Ventilation and Air Conditioning.
3. Electrical.
4. Sanitary.
5. Equipment.

The total dollar cost as well as the dollars per square foot cost are presented.

Areas of Most Importance

The areas considered most important were:

1. Acute Oral Exposure Area, Rodent
2. Subchronic Oral Exposure Area, Rodent
3. Chronic Oral Exposure Area, Rodent
4. Subchronic Oral Exposure Area, Dog
5. Acute Inhalation Exposure Area, Rodent
6. Subchronic Inhalation Exposure Area, Rodent
7. Chronic Inhalation Exposure Area, Rodent
8. Acute Inhalation Exposure Area, Primate
9. Subchronic Inhalation Exposure Area, Primate
10. Chronic Inhalation Exposure Area, Primate
11. Dermal Testing Area, Rabbit
12. Ocular Testing Area, Rabbit
58. Dermal Testing Area, Rodent(a)
13. Behavioral Studies Area
14. Metabolism/Pharmacokinetics Studies Area
15. Pharmacodynamics Studies Area
16. Oncogenic Studies Area
17. Respiratory Physiology Studies Area
18. Reproduction Studies Area

(a) Some modules are numbered out of sequence since they were added after the module numbering system was established.

19. Teratology Studies Area
61. Neurotoxicology Studies Area, Chicken
62. In Vitro Genetic Toxicology Studies Area
63. In Vivo Genetic Toxicology Studies Area

Areas of Intermediate Importance

20. Food Preparation/Blending Area
21. Non-radioactive Waste Handling/Disposal Area
22. Refrigerated Food Storage Area
23. Quality Assurance Laboratory
24. Animal Quarantine Area
25. Pathology Laboratory
26. Clinical Chemistry Laboratory
27. Animal Breeding Area
28. Veterinary Medicine Area
29. Analytical/Synthetic Chemistry Laboratory
30. Automated Data Processing Area
31. Radiochemistry Laboratory

Areas of Minor Importance

The areas considered of minor importance were:

32. Cage/Rack Washing and Storage Area
33. Chemical Storage Area
34. Showers, Lockers and Toilets Area
35. Glassware Washing Area
36. Library Area
37. Technical Offices Area
60. Administrative Offices Area
38. Shipping and Receiving Area
39. Luncheon Room Area
40. Record Archives Area
41. Specimen Storage Area
42. Linen Storage Area
43. Janitorial Storage Area
45. Equipment Maintenance Area
46. Laundry Area

Facility Central Utilities Areas

The Facility central utilities were:

44. Central Cylinder Gas Storage Area
47. Central Power Area
48. Central Standby (Emergency) Power Area
49. Central Water Supply Conditioning Area
50. Central Wastewater Conditioning Area
51. Central Air Handling Area
52. Central Heating Area
53. Central Compressed Air/Vacuum Area

54. Central Communications Area
55. Central Refrigeration Area
56. Central Toilet Area
57. Central Vacuum Cleaning Area
59. Central Automated Facility Systems Control Area

GENERAL SPECIFICATIONS AND ASSUMPTIONS

Prior to and during the design of the 63 modules, certain general specifications and general assumptions were used and made, respectively. These are cited below.

General Specifications

The general specifications for the module designs included:

1. All doors subject to cage rack passage shall be 4-ft. wide. All others shall be 3-ft. wide except for those that employ double doors which would then be 6- or 8-ft. wide.

2. Doors to laboratories and test areas will have view panels.

3. In general the wall construction will be 6 in. block partitions or 2 x 4 in. studs (or equivalent).

4. The floors will be chemically resistant, antislip, monolithic, epoxy floors (e.g., Selba-Clad) with floor-to-wall junctions covered for cleaning and sanitation. To protect the walls from damage when moving the rack and cages, the floor-to-wall junction will be offset into the corridor forming a tapered interface.

5. No floor drains will be located in the corridors.

6. In all wet areas and those subject to washdown, weatherproofed electrical outlets will be used.

7. Sprinklers will be installed throughout the animal rooms and laboratories, except where inappropriate such as the computer areas, incinerator room and boiler room. In the latter cases, a Halon 1301 fire extinguishing system will be used.

8. A smoke detection system shall be used throughout.

9. The electrical power to outlets shall be 120 V, single phase in general. In certain locations 208 V, single phase will be available at special equipment outlets. With certain equipment 208 V, three phase direct wiring will be used.

10. The air supply to all animal areas will be prefiltered and High Efficiency, Particulate Air (HEPA) filtered.

11. The exhaust air from hoods, animal rooms, treatment rooms, blending areas and other contaiminated spaces will be prefiltered, HEPA filtered and carbon filtered.

12. The normal ceiling heights will be either 8 or 9 ft. except where noted. The corridor ceiling will be moisture-resistant, epoxy painted drywall. The ceiling-to-wall junctions will be sealed with epoxy caulk.

13. The telephone system will provide for intercoms in all laboratories, offices, animal areas and high volume use areas. In wet areas and those subject to washdown they will be provided with suitable weather-proof covers.

14. Certain floors associated with animal movements shall be color coded to reflect level of cleanliness.

15. Air locks and anteroom concept [illegible] used instead of pressure zones or clean-dirty corrid[illegible]pt. This provides ready access to all storage rooms, electri[illegible]aker switches, non-animal holding rooms, laboratories, elevato[illegible] the rest of the building.

Animal Rooms - The following characteristics are incorporated into the animal room specifications.

1. All cracks are to be sealed with epoxy caulk (floor-to-wall, ceiling-to-wall, exhaust ducts, electrical fixtures. etc.)

2. Each room will have timed lighting with a recessed light timer just outside the access door to control the light cycles in the room.

3. A two-stage lighting system will be used. When only the animals are in the room, a light level of 50 ft. candles will be used. When personnel are working or observing within the room, a light level of 100 ft. candles can be made operable by activating a switch next to the light timer control at the door. An automatic timer will switch from the high level to the energy conservation level if personnel forget to turn off the second stage lights. In the complete off position, both first and second stage lights will be turned off.

4. An automatic animal watering system will be used throughout all animal treatment and holding areas.

5. Only one permanent piece of equipment will be included. It will consist of a wall mounted, hooded treatment table with sink. It will be without a storage area underneath to prevent accumulation of unneeded supplies and avoid areas for infestation.

6. All cracks are to be sealed with epoxy caulk (floor-to-wall, ceiling-to-wall, exhaust ducts, electrical fixtures, etc.)

7. The fluorescent-light fixtures will be sealed and moisture-proof.

8. The doors leading into the animal rooms will contain a viewing window. A drop seal at the bottom of each door will be used to prevent any escaped animal from entering various rooms.

9. All doors opening into a room will be self-closing and have recessed hardware and locks.

10. The wall construction will be masonry block sealed with block filler and painted with epoxy paint 8 mils thick minimum.

Module Specific Specifications - The module specific specifications illustrated for a few modules are:

1. Each Cold Storage Room will have a high- and low-temperature alarm. The room volume will be in submodule units of 12 x 18 x 7 ft.

2. The ceiling height of the Cage/Rack Washing (sanitation) Area shall be 13 ft. to allow more space for dispersion of the steam generated by the washing equipment. All cold air ducts in this area will be insulated to eliminate condensation and moisture dripping on employees and equipment.

   The only passage from the "dirty" side of the cage wash subarea to the "clean" side will be through the rack or tunnel washers. The washer doors are to have electronic interlocks so only one door can be opened at a time.

3. The Record Archive and Specimen Storage Areas will have their rooms separated by fire-rated walls with fire-rated self-closing doors. The ceilings will be constructed of fire-rated materials. Floors are to be concrete. The areas are to be equipped with a Halon 1301 fire extinguishing system. A central security system is provided to prevent unauthorized entry. A temperature control system will maintain storage rooms at 50-80 F. A routine test and/or vermin control service will be employed. Fireproof metal shelving will be employed.

4. Because of the use of volatile chemicals (organic) and their potential danger due to flammability and explosive properties, the floors of the Pathology Laboratory will be made of conductive material. This minimizes the risk of electrical-charge build-up. All electrical outlets will be explosion-proof. All tables will have hooded exhaust systems above them.

5. For animal watering, city water will be softened and passed through charcoal filters to absorb traces of chlorine, taste and odor. It will then pass through a reverse osmosis membrane barrier where 90% of the dissolved solid and 98% of the bacteria, colloids and organic materials will be removed. From the reverse-osmosis unit it will go to a reservoir tank. Water will exit this tank with a centrifugal pump. It will pass through an ultraviolet light source to kill

microorganisms and sterilize the water. It will then pass through three charcoal filters to remove ozone and hydrogen peroxide generated by the ultraviolet light.

An important aspect of the automatic animal watering system is that the water will be constantly flowing and is not stagnant in the room distribution piping system.

Some of the above specifications resulted from the reporting of Bulk (Bulk 1980).

General Assumptions

The following general assumptions were made regarding the Facility Module Descriptions in Appendix 1:

1. The overall dimensions are approximate, allowing for wall thicknesses and rounded to the nearest foot.

2. No burgler alarm system was included.

3. Corridor air lock doors are generally not shown but implied. Direction of opening is to be subject to exit code requirements.

4. No breeding or quarantine areas were assumed for primates or dogs.

5. No provisions were made for housing chickens. This will be added when the Neurotoxicity Studies get more clearly defined.

6. The quarantine area has been modularized so that one, two, three ..., can be added in parallel to meet the total Facility's requirements capacity.

7. Direction of air flow, i.e., higher to lower pressure, is shown only where critical. If it is not shown it assumes equal pressure acceptable or to be determined.

8. Budget estimates for individual modules do not include costs for: building shell, floor slabs, structural elements (columns, beams, footings), stairways, elevators, main corridors, land, site improvement, site utilities, renovation work, special phasing costs, design costs, contingencies, permits, fees or legal work.

9. Individual module layouts are conceptual, intended to account for all necessary space in a logical arrangement. When applied to a specific site, they must be adjusted to suit all physical constraints, provide an orderly corridor system and eliminate redundant features.

CONCLUSIONS

The following are some of the conclusions resulting from the Facility Capability Modules Study:

1. A unique method was formulated to handle the rapid data acquisition and simultaneous development of what normally would be sequentially occurring events. It employed a modular concept for the design of areas and laboratories needed within a full service capability, Applied Mammalian Toxicology Research/Testing Facility. The selected modules provide most of the known capabilities from the small to the most sophisticated.

2. The selected Facility service and capacity is a function of MRDC/DA decision-making processes and can be easily incorporated due to the modular concept approach used in the facility design.

3. The modular design conceived provides for full-service capability. It permits the decision-makers the option to pick and choose which capabilities are essential based upon requirements, priorities, budgets, personnel resources, etc.

4. Use of an airlock/anteroom approach was found more acceptable than use of pressure differential zones or clean/dirty corridors. The preferred approach incorporates into each testing module its own air handling and ventillation system for greater safety, flexibility and lower life cycle operating costs.

REFERENCES

Balk M. 1980. Animal-facility design criteria for a toxicological testing laboratory. Pharm. Tech. April.

Life Systems, Inc. 1981a. Comparative analysis report. TR-477-2. Cleveland, OH: Life Systems, Inc.

Life Systems, Inc. 1981b. Technical plan. TR-477-20. Cleveland, OH: Life Systems, Inc.

APPENDIX 1

MAMMALIAN TOXICOLOGY RESEARCH/TESTING FACILITY
CAPABILITY MODULES

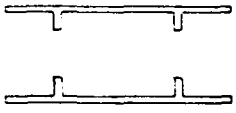
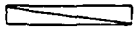
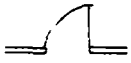
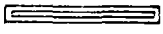
Introduction

This Appendix contains copies of the form used to characterize and describe the capability of each module designed for the Mammalian Toxicology Research/ Testing Facility. They are listed sequentially by module number but are not page numbered.

Symbols

The symbols utilized are shown below and relate to symbols found on the floor plans of the various facility modules.

KEY TO COMMON SYMBOLS

Symbol	Item
	Air Lock
	Cabinet
	Cage Rack
	Chair
	Desk
	Door
	Double Wall
	Fume Hood
	Table or Laboratory Bench
	Temporary Position of Portable Cage Rack
	Work Table with Sink

LIST OF MODULES

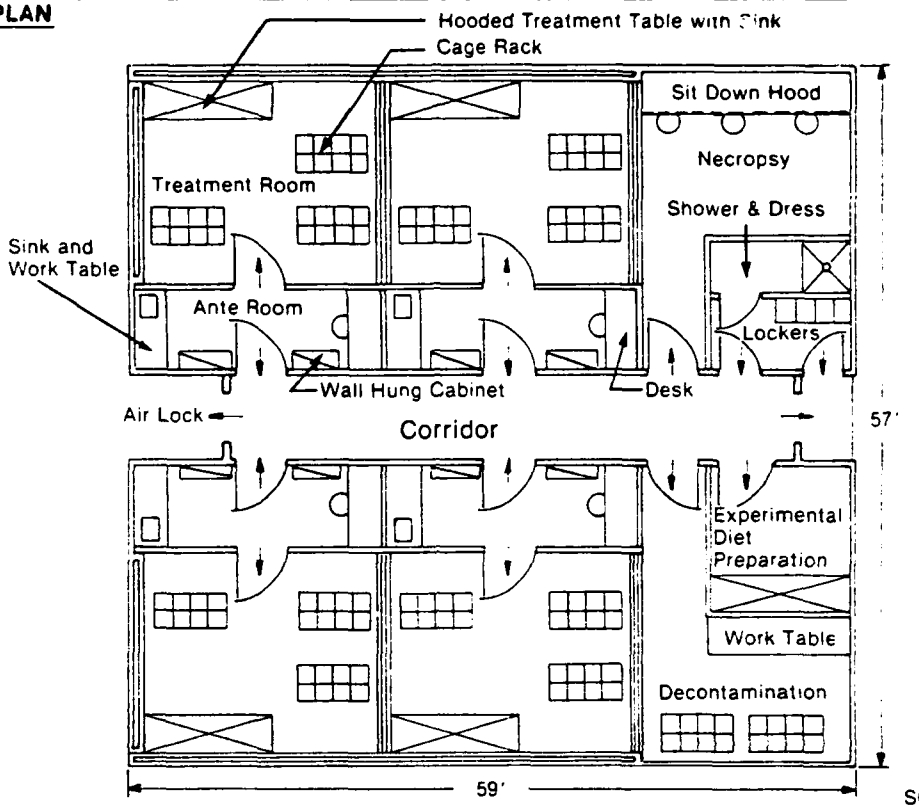
No.	Title
1.	Acute Oral Exposure Area, Rodent
2.	Subchronic Oral Exposure Area, Rodent
3.	Chronic Oral Exposure Area, Rodent
4.	Subchronic Oral Exposure Area, Dog
5.	Acute Inhalation Exposure Area, Rodent
6.	Subchronic Inhalation Exposure Area, Rodent
7.	Chronic Inhalation Exposure Area, Rodent
8.	Acute Inhalation Exposure Area, Primate
9.	Subchronic Inhalation Exposure Area, Primate
10.	Chronic Inhalation Exposure Area, Primate
11.	Dermal Testing Area, Rabbit
12.	Ocular Testing Area, Rabbit
13.	Behavioral Studies Area
14.	Metabolism/Pharmacokinetics Studies Area
15.	Pharmacodynamics Studies Area
16.	Oncogenic Studies Area
17.	Respiratory Physiology Studies Area
18.	Reproduction Studies Area
19.	Teratology Studies Area
20.	Food Preparation/Blending Area
21.	Non-radioactive Waste Handling/Disposal Area
22.	Refrigerated Food Stroage Area
23.	Quality Assurance Laboratory
24.	Animal Quarantine Area
25.	Pathology Laboratory
26.	Clinical Chemistry Laboratory
27.	Animal Breeding Area
28.	Veterinary Medicine Area
29.	Analytical/Synthetic Chemistry Laboratory
30.	Automated Data Processing Area
31.	Radiochemistry Laboratory
32.	Cage/Rack Washing and Storage Area
33.	Chemical Storage Area
34.	Showers, Lockers and Toilets Area
35.	Glassware Washing Area
36.	Library Area
37.	Technical Offices Area
38.	Shipping and Receiving Area
39.	Luncheon Room Area
40.	Record Archives Area
41.	Specimen Storage Area
42.	Linen Storage Area
43.	Janitorial Storage Area
44.	Central Cylinder Gas Storage Area
45.	Equipment Maintenance Area
46.	Laundry Area
47.	Central Power Area

No.	Title
48.	Central Standby (Emergency) Power Area
49.	Central Water Supply Conditioning Area
50.	Central Wastewater Conditioning Area
51.	Central Air Handling Area
52.	Central Heating Area
53.	Central Compressed Air/Vacuum Area
54.	Central Communications Area
55.	Central Refrigeration Area
56.	Central Toilet Area
57.	Central Vacuum Cleaning Area
58.	Dermal Testing Area, Rodent
59.	Central Automated Facility Systems Control Area
60.	Administrative Office Area
61.	Neurotoxicology Studies Area, Chicken
62.	*In Vitro* Genetic Toxicology Studies Area
63.	*In Vivo* Genetic Toxicology Studies Area

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



CONSTRUCTION INFORMATION

Dimensions: 59 x 57 Ft.
Area: 3.363 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐_____
Air Flow: 7,500 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously.
2. Double walls for air pressure control in rooms and sound isolation.
3. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local diet preparation
   - Local necropsy
   - Local cage/rack decontamination

SPECIAL ASSUMPTIONS

1. Tests of highly hazardous materials must be performed.
2. Safety considerations require local necropsy and diet preparation.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	84	25
Heat, Vent., Air Cond.	54	16
Electrical	64	19
Sanitary	27	8
Equipment	83	25
Total	312	93

TITLE Acute Oral Exposure Area, Rodent

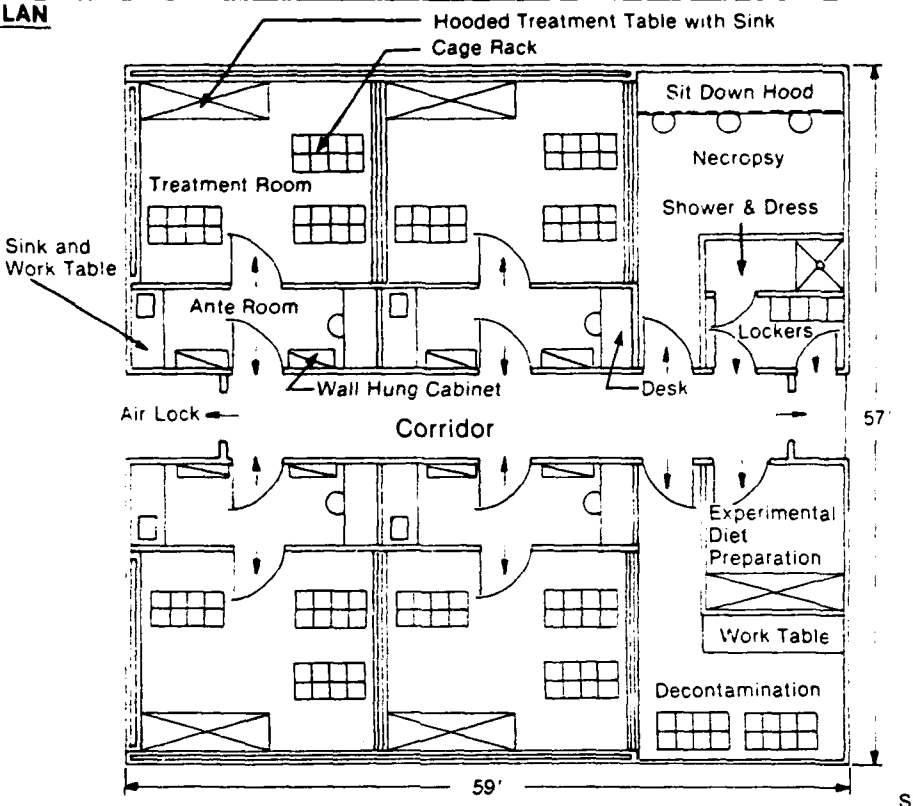
NO. 1

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 59 x 57 Ft.
Area: 3,363 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐_____
Air Flow: 7,500 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously.
2. Double walls for air pressure control in rooms and sound isolation.
3. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local diet preparation
   - Local necropsy
   - Local cage/rack decontamination

SPECIAL ASSUMPTIONS

1. Tests of highly hazardous materials must be performed.
2. Safety considerations require local necropsy and diet preparation.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	84	25
Heat, Vent., Air Cond.	54	16
Electrical	64	19
Sanitary	27	8
Equipment	83	25
Total	312	93

TITLE

Subchronic Oral Exposure Area, Rodent

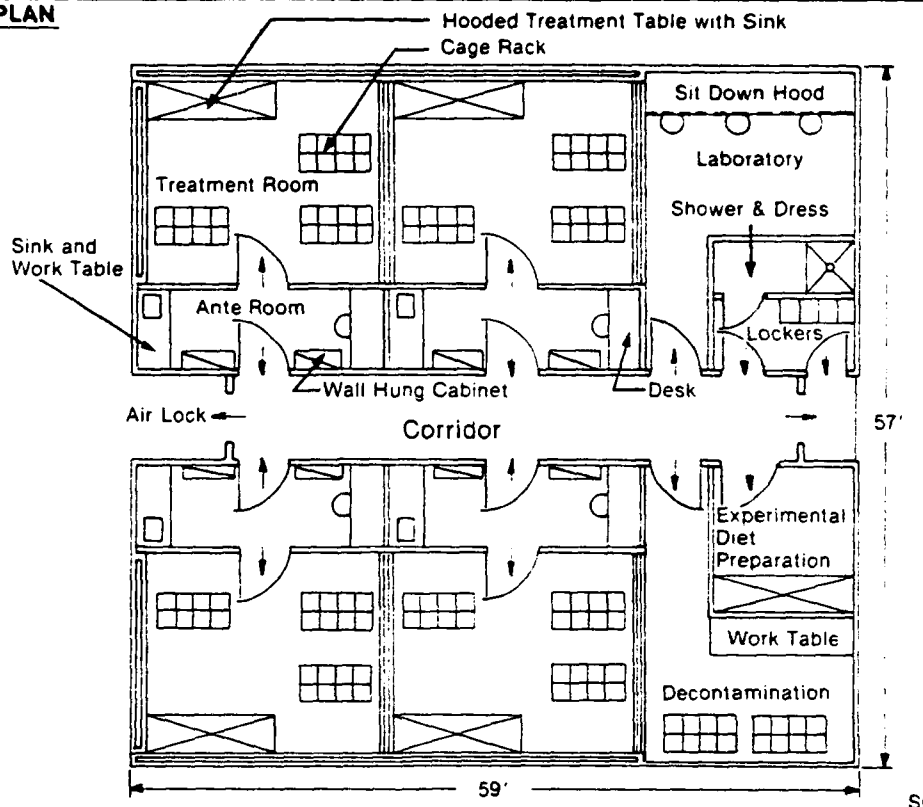
NO. 2

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 59 x 57 Ft.
Area: 3,363 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐_____
Air Flow: 7,500 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously.
2. Double walls for air pressure control in rooms and sound isolation.
3. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local diet preparation
   - Local necropsy
   - Local cage/rack decontamination

SPECIAL ASSUMPTIONS

1. Tests of highly hazardous materials must be performed.
2. Safety considerations require local necropsy and diet preparation.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	84	25
Heat, Vent., Air Cond.	54	16
Electrical	64	19
Sanitary	27	8
Equipment	83	25
Total	312	93

TITLE Chronic Oral Exposure Area, Rodent

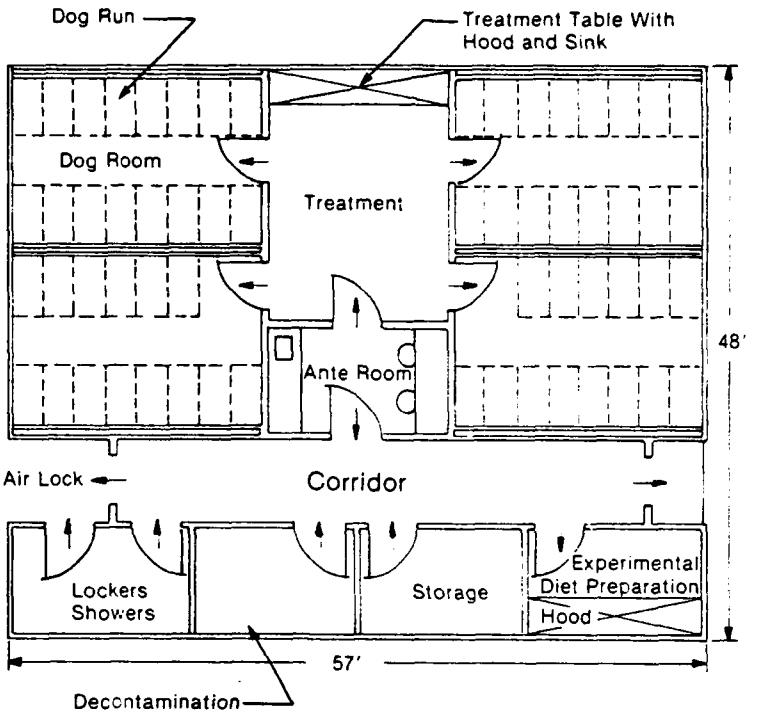
NO. 3

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 57 x 48 Ft.
Area: 2,736 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 6,000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☒ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously.
2. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local diet preparation

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	68	25
Heat, Vent., Air Cond.	44	16
Electrical	52	19
Sanitary	22	8
Equipment	110	40
Total	296	108

TITLE

Subchronic Oral Exposure Area, Dog

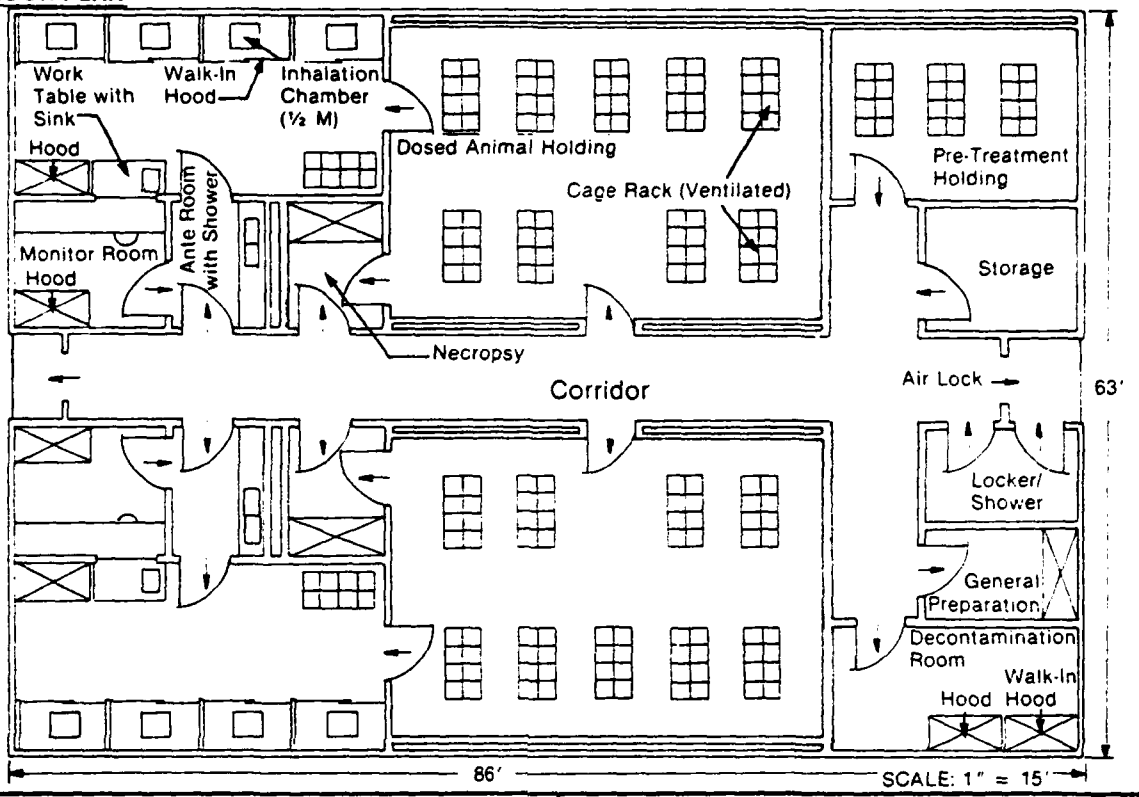
NO. 4

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



CONSTRUCTION INFORMATION

Dimensions: 86 x 63 Ft.
Area: 5,418 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 17,600 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test two chemicals simultaneously.
2. Separate dosed animal holding areas avoids cross-contamination.
3. Walk-in hoods provide safe maintenance of chambers from all sides.
4. Compatible with highly hazardous tests:
   - Ante room permits personnel decontamination
   - Local necropsy
   - Local decontamination

SPECIAL ASSUMPTIONS

1. Desirable to have local pre-test animal holding area.
2. Desirable to have local necropsy.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	135	25
Heat, Vent., Air Cond.	87	16
Electrical	103	19
Sanitary	43	8
Equipment	270	50
Total	638	118

TITLE
Acute Inhalation Exposure Area, Rodent

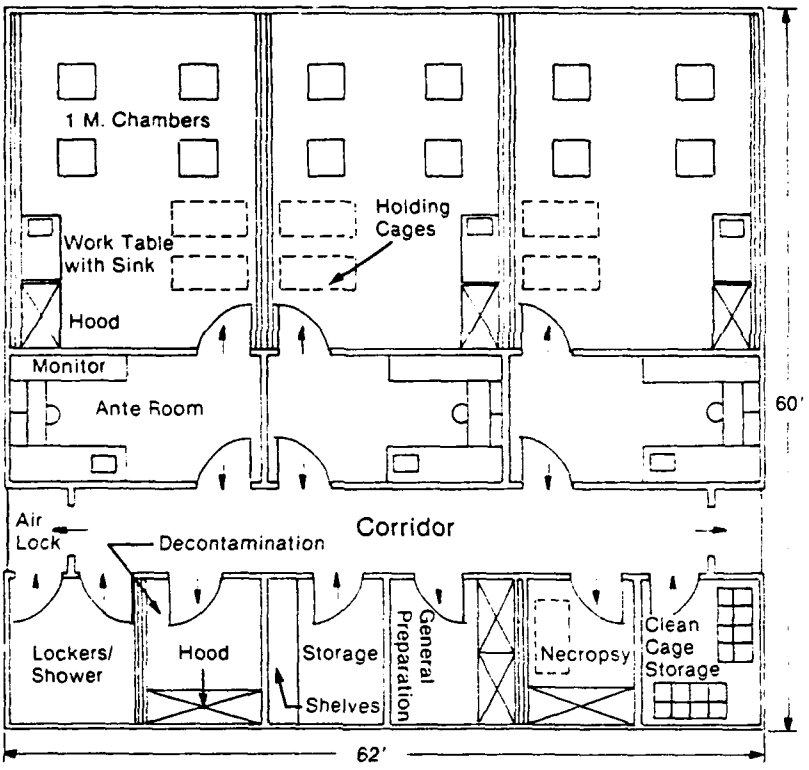
NO. 5

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 62 x 60 Ft.
Area: 3,720 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 12,100 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Compatible for intermittent (6-8 hours per day) or continuous exposure tests.
2. Can test three chemicals simultaneously.
3. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local necropsy
   - Local decontamination

SPECIAL ASSUMPTIONS

Desirable to store clean cages in module.

COST ESTIMATE

	Total $/000)	Resulting $/Sq. Ft.
General Construction	93	25
Heat, Vent., Air Cond.	60	16
Electrical	71	19
Sanitary	30	8
Equipment	420	113
Total	674	181

TITLE Subchronic Inhalation Exposure Area, Rodent

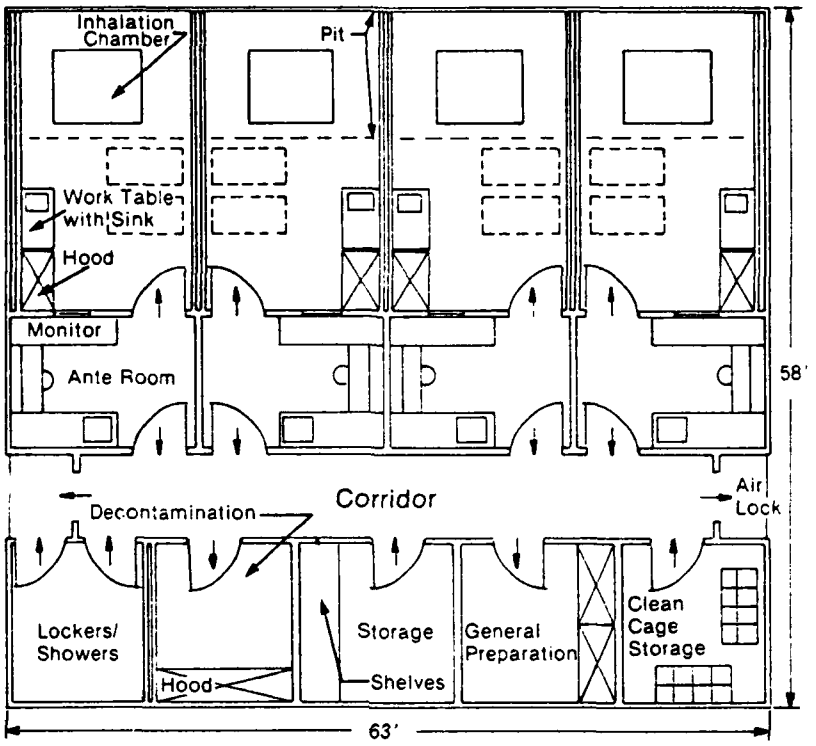
NO. 6

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 63 x 58 Ft.
Area: 3,654 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 11,900 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Compatible with intermittent (6-8 hours per day) continuous exposure tests.
2. Chambers mounted in 5 ft. pit under 13 ft. ceiling.
3. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local decontamination

SPECIAL ASSUMPTIONS

1. One chemical tested at a time.
2. Separate storage area required.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	91	25
Heat. Vent., Air Cond.	58	16
Electrical	69	19
Sanitary	29	8
Equipment	320	88
Total	567	156

TITLE Chronic Inhalation Exposure Area, Rodent

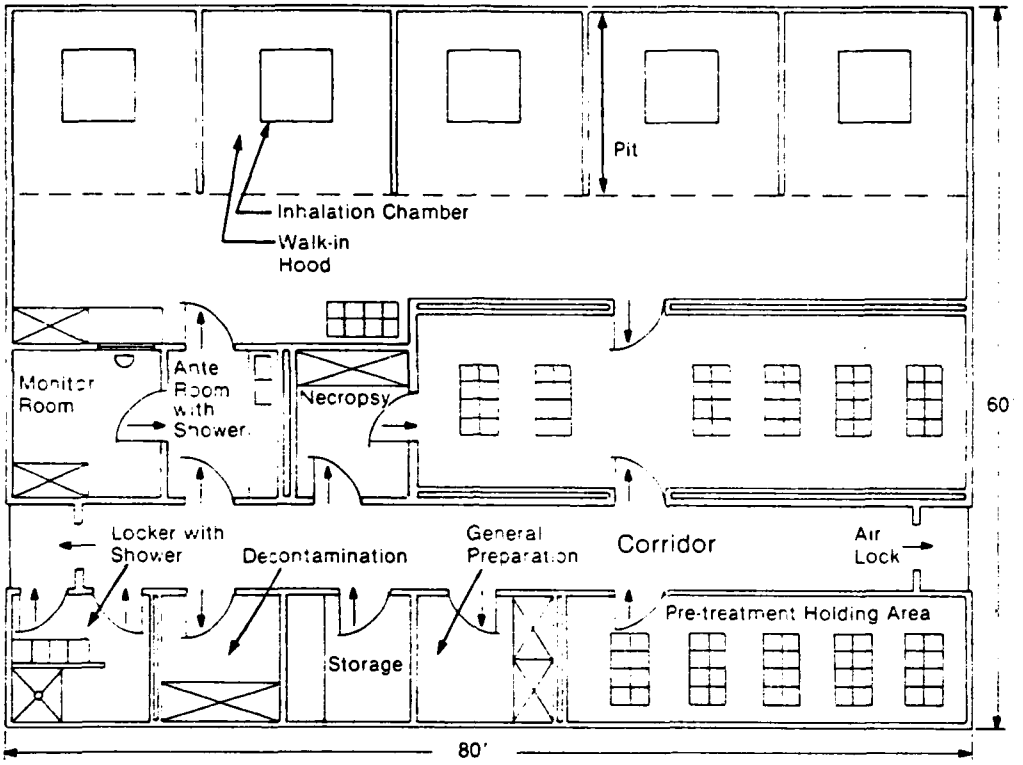
NO. 7

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 80 x 60 Ft.
Area: 4,800 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 15,600 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test single chemical at a time.
2. Walk-in hoods make possible safe maintenance of chambers, with access from all sides.
3. Primates quickly available for testing from pre-treatment holding area.
4. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local preparation
   - Local necropsy
   - Local decontamination

SPECIAL ASSUMPTIONS

1. Desirable to store animals in module before testing.
2. Safety considerations require local necropsy and decontamination.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	120	25
Heat, Vent., Air Cond.	77	16
Electrical	91	19
Sanitary	38	8
Equipment	270	56
Total	596	124

TITLE: Acute Inhalation Exposure Area, Primate

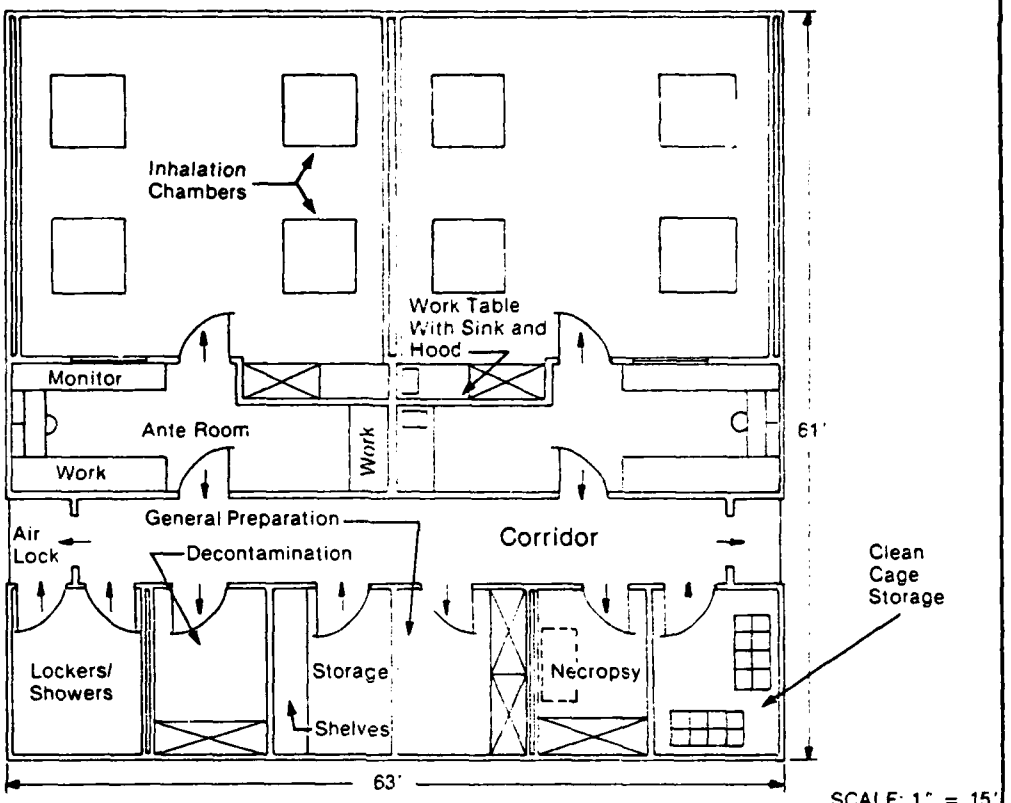
NO.: 8

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 63 x 61 Ft.
Area: 3,843 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 12,500 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test two chemicals simultaneously.
2. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local preparation room
   - Local necropsy
   - Local decontamination

SPECIAL ASSUMPTIONS

1. Desirable to store clean cages locally.
2. Safety considerations require local preparation and necropsy rooms.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	96	25
Heat. Vent.. Air Cond.	61	16
Electrical	73	19
Sanitary	31	8
Equipment	280	73
Total	541	141

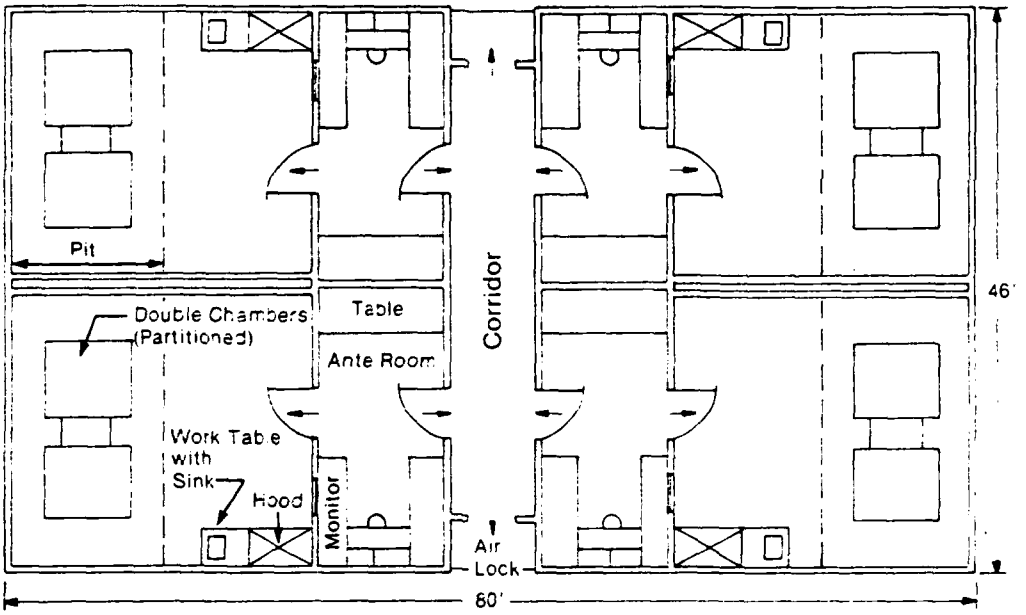
TITLE	NO.
Subchronic Inhalation Exposure Area, Primate	9

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 80 x 46 Ft.
Area: 3,680 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 12,000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Compatible with intermittent (6-8 hours per day) and continuous exposure tests.
2. Module sized for testing one chemical at a time
3. Ante room isolates corridor for safer testing of hazardous materials.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	92	25
Heat. Vent., Air Cond.	59	16
Electrical	70	19
Sanitary	29	8
Equipment	260	71
Total	510	139

TITLE: Chronic Inhalation Exposure Area, Primate

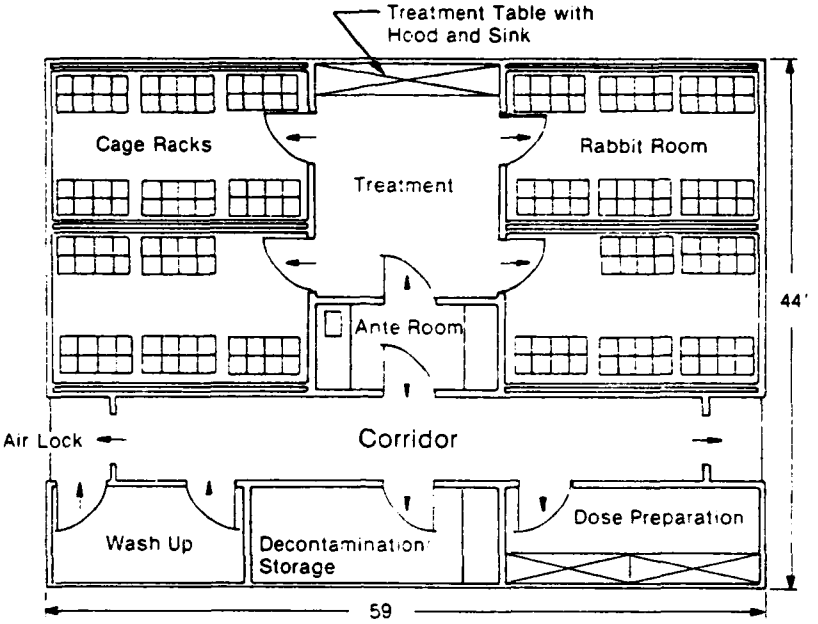
NO.: 10

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 59 x 44 Ft.
Area: 2,596 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐_____
Air Flow: 6,000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air: ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously.
2. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local dose preparation
   - Local decontamination

SPECIAL ASSUMPTIONS

Treatment table with hood and sink may be used for local necropsy.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	65	25
Heat, Vent., Air Cond.	42	16
Electrical	49	19
Sanitary	21	8
Equipment	53	20
Total	230	88

TITLE

Dermal Testing Area, Rabbit

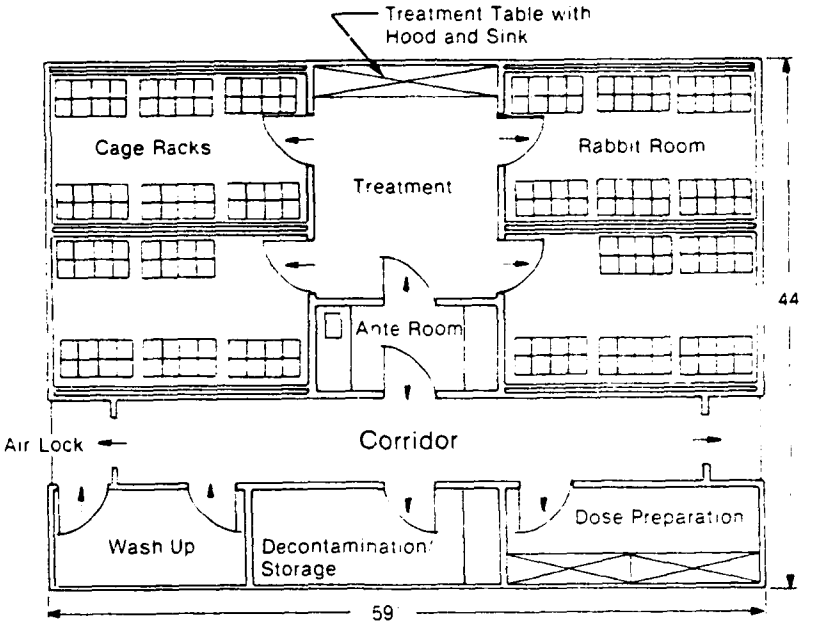
NO. 11

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 59 x 44 Ft.
Area: 2,596 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 6,000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
Compressed Air: ☐ Vacuum; ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously.
2. Compatible with highly hazardous tests:
   - Ante room isolates corridor
   - Local dose preparation
   - Local decontamination

SPECIAL ASSUMPTIONS

Treatment table with hood and sink may be used for local necropsy.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	65	25
Heat. Vent., Air Cond.	42	16
Electrical	49	19
Sanitary	21	8
Equipment	46	18
Total	223	86

TITLE

Ocular Testing Area, Rabbit

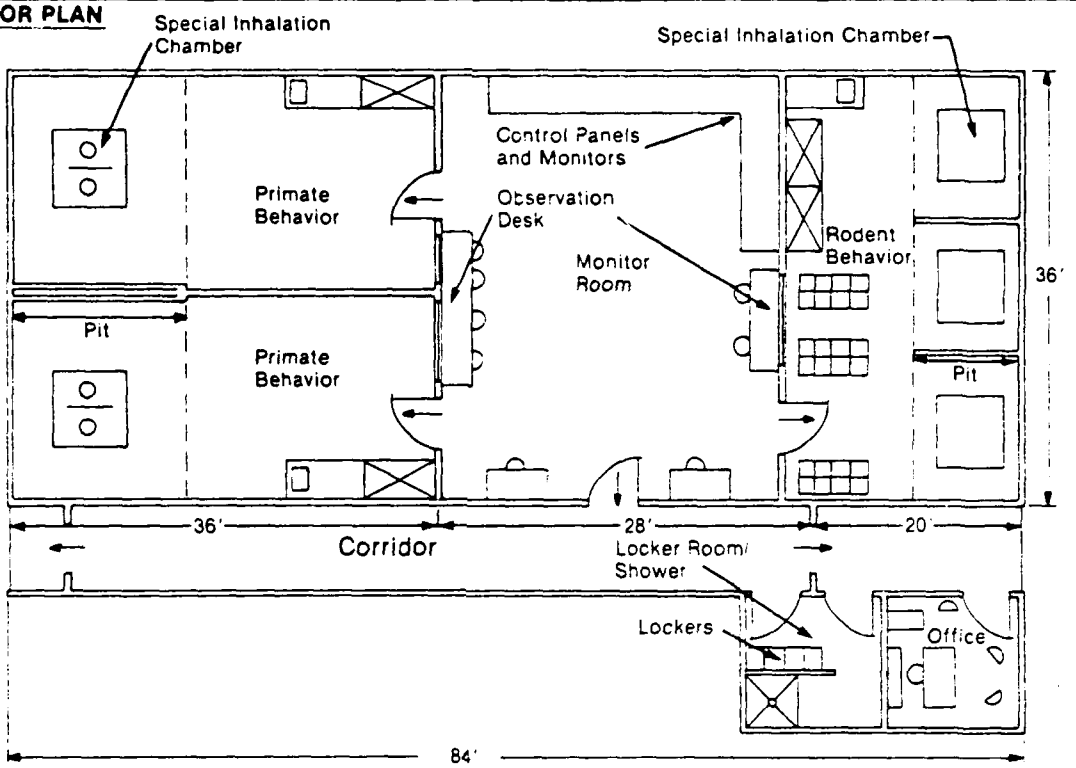
NO. 12

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1' = 15'

CONSTRUCTION INFORMATION

Dimensions: 84 x 36 Ft. x 26 x 11 Ft.
Area: 3,310 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 11,000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can perform two studies simultaneously.
2. Special chambers and extra floor space provided for testing flexibility.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	83	25
Heat, Vent., Air Cond.	53	16
Electrical	63	19
Sanitary	26	8
Equipment	720	218
Total	945	286

TITLE Behavioral Studies Area

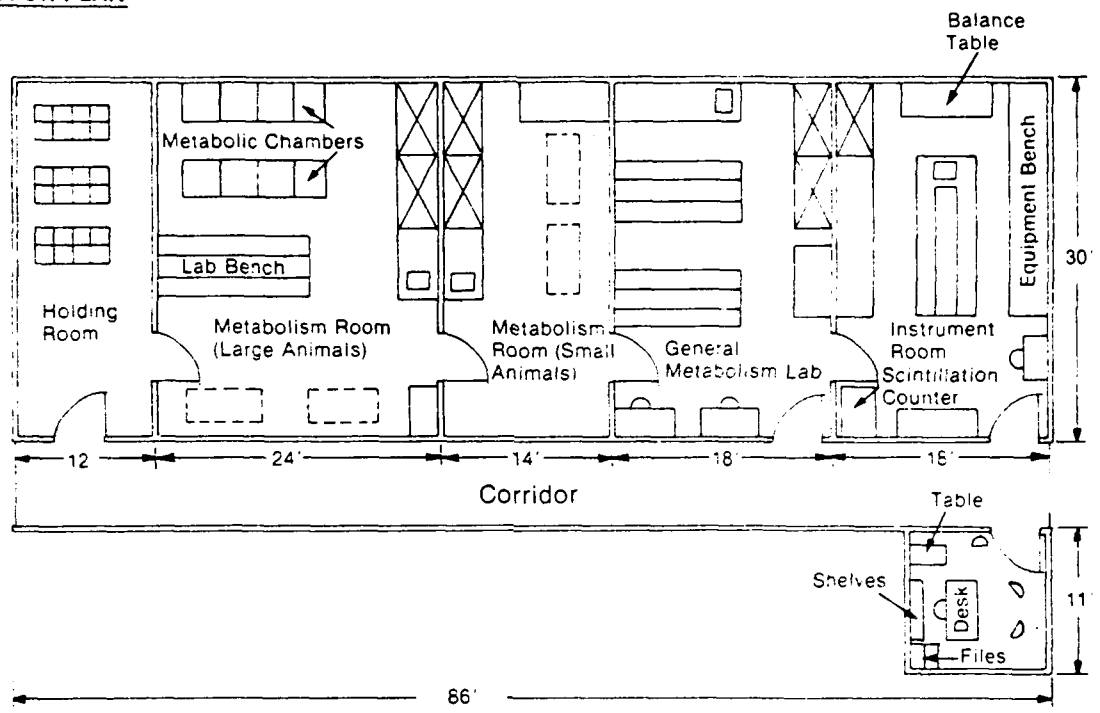
NO. 13

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 86 x 30 Ft. and 12 x 11 Ft. Ft.
Area: 2,712 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 6,100 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air: ☒ Vacuum; ☒ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can perform two studies simultaneously.
2. Capability for testing primates and rodents.

SPECIAL ASSUMPTIONS

Desirable to have local holding area.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	68	25
Heat, Vent., Air Cond.	43	16
Electrical	52	19
Sanitary	22	8
Equipment	390	144
Total	575	212

TITLE
Metabolism/Pharmacokinetics Studies Area

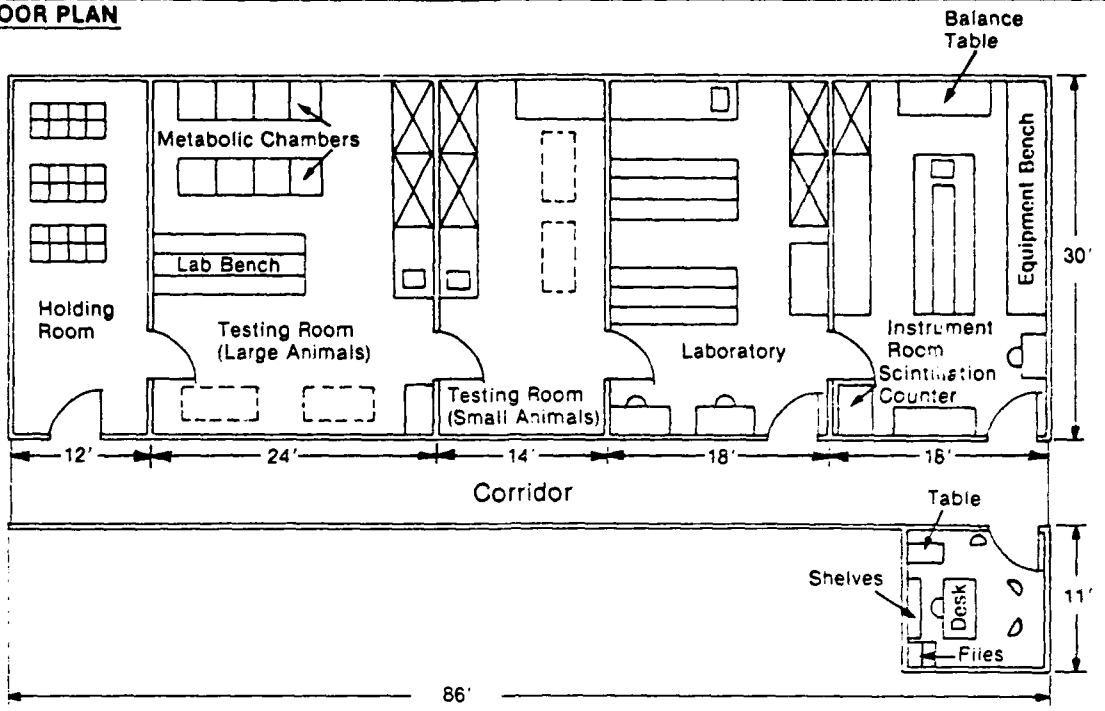
NO. 14

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 86 x 30 Ft. and 12 x 11 Ft.
Area: 2,712 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 6,100 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can perform two studies simultaneously.
2. Capability for testing primates and rodents.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	68	25
Heat. Vent., Air Cond.	43	16
Electrical	52	19
Sanitary	22	8
Equipment	390	144
Total	575	212

TITLE

Pharmacodynamics Studies Area

NO. 15

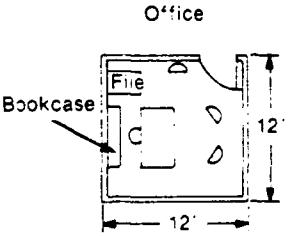
F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN

	Exposure Route	Type Animal	Floor Plan
A.	Oral	Rodent	Module No. 3
B.	Inhalation	Rodent	Module No. 7
C.	Inhalation	Primate	Module No. 10



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 59 x 57, 63 x 58, 80 x 46 and 12 x 12 Ft.
Area: 10,841 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☒ 13' ☐_____
Air Flow: _____ CFM ☒ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air; ☒ Vacuum; ☐ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Capability for all anticipated oncogenicity tests included.

SPECIAL ASSUMPTIONS

1. Oncogenic testing will require oral and inhalation exposure tests of rodents, and inhalation exposure tests of primates.
2. One office is required for scientist in charge.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	271	25
Heat. Vent., Air Cond.	173	16
Electrical	206	19
Sanitary	87	8
Equipment	880	81
Total	1,617	149

TITLE Oncogenic Studies Area

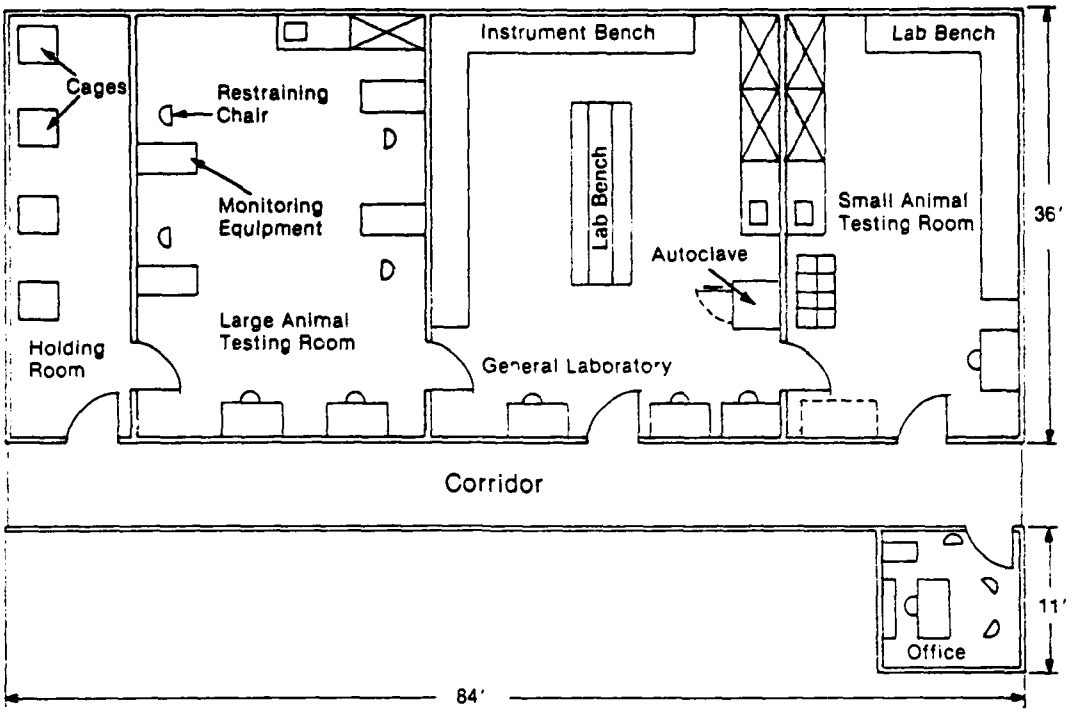
NO. 16

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 84 x 36 Ft. and 12 x 11 Ft. Ft.
Area: 3,156 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐_____
Air Flow: 7,100 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can perform two studies simultaneously.
2. Capability for testing primates and rodents.

SPECIAL ASSUMPTIONS

Desirable to have local animal holding area.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	79	25
Heat. Vent.. Air Cond.	50	16
Electrical	60	19
Sanitary	25	8
Equipment	270	86
Total	484	154

TITLE

Respiratory Physiology Studies Area

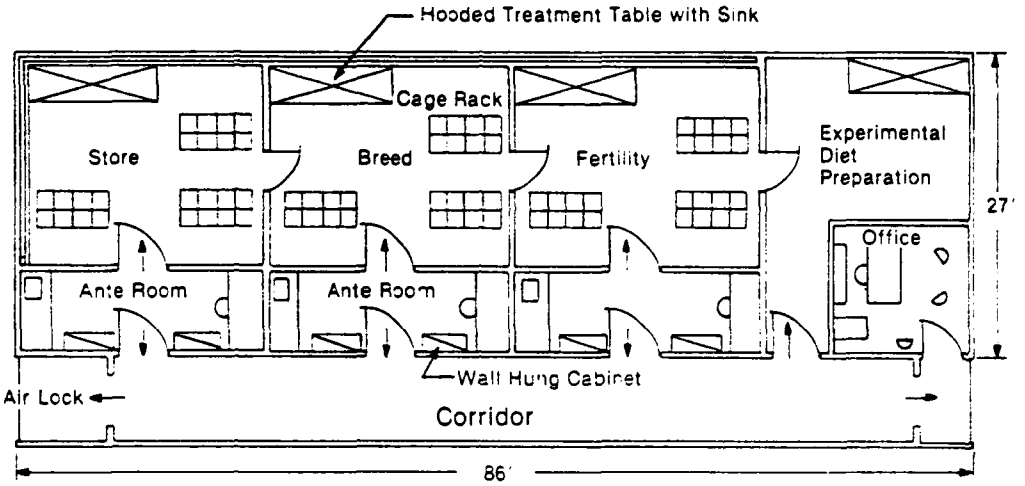
NO. 17

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 86 x 27 Ft.
Area: 2.322 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 5.200 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Capability for highly hazardous tests:
- Ante room isolates corridor
- Local diet preparation

SPECIAL ASSUMPTIONS

None

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	58	25
Heat, Vent., Air Cond.	37	16
Electrical	44	19
Sanitary	19	8
Equipment	69	30
Total	227	98

TITLE Reproduction Studies Area

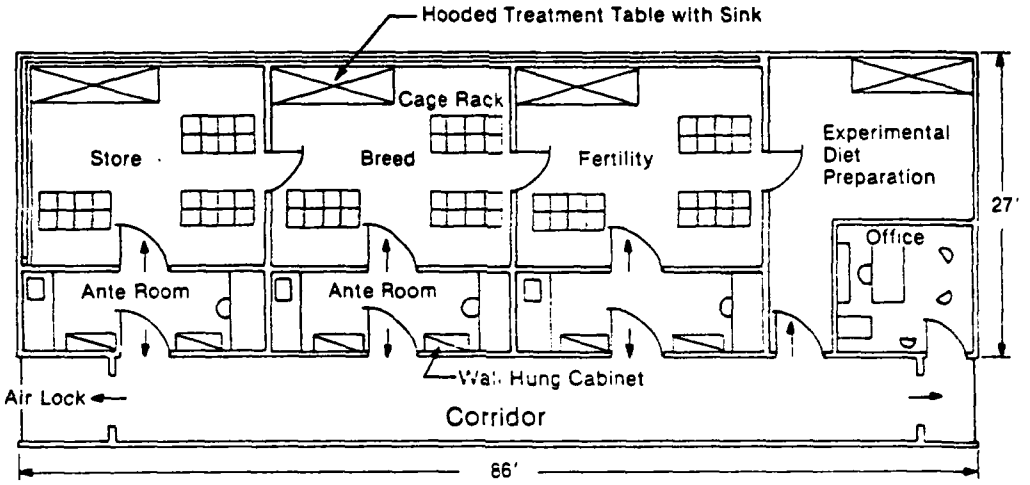
NO. 18

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 86 x 27 Ft.
Area: 2,322 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐_____
Air Flow: 5,200 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air; ☒ Vacuum: ☐ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Capability for highly hazardous tests:
- Ante room isolates corridor
- Local diet preparation

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	58	25
Heat. Vent.. Air Cond.	37	16
Electrical	44	19
Sanitary	19	8
Equipment	69	30
Total	227	98

TITLE

Teratology Studies Area

NO.

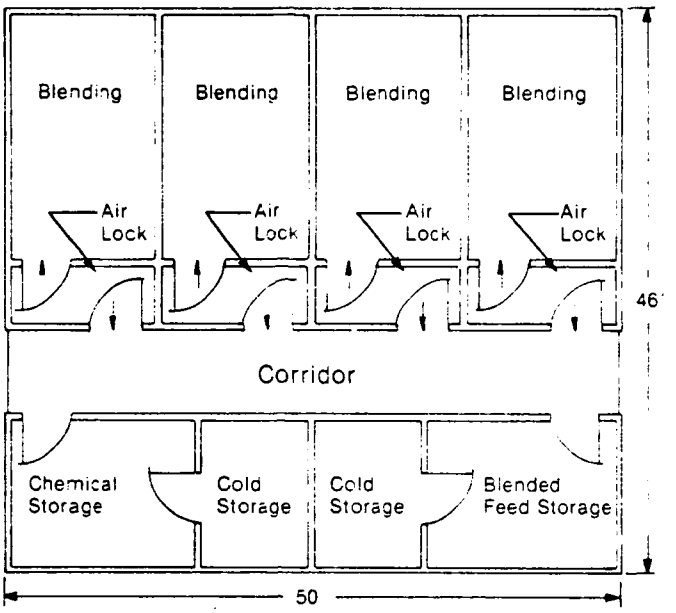
19

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 50 x 46 Ft.
Area: 2,300 Sq. Ft.
Ceiling Height _ 8' X 9' _ 13' _____
Air Flow: 4,000 CFM _ Variable
Air Changes/Hour: 12
Floor Drains: Capped _ Flushing Other
Water: X Hot X Cold _ None No Make-up
Central Vacuum Cleaning: X Yes No
Local Exhaust Filtration: Yes X No
Epoxy Coated: X Walls X Floors X Ceilings
Sprinklers: _ Yes X No Halon Optional
Timed Lighting
Compressed Air: _ Vacuum: Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can blend foods with four chemical simultaneously.
2. Air locks isolate corridor for increased safety when blending feed with highly hazardous materials.

SPECIAL ASSUMPTIONS

1. Desirable to have capability for blending more than one dosed feed at a time.
2. Cross-contamination of feeds will not occur in single blended feed storage area.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	58	25
Heat. Vent., Air Cond.	37	16
Electrical	44	19
Sanitary	18	8
Equipment	96	42
Total	253	110

TITLE Food Preparation/Blending Area

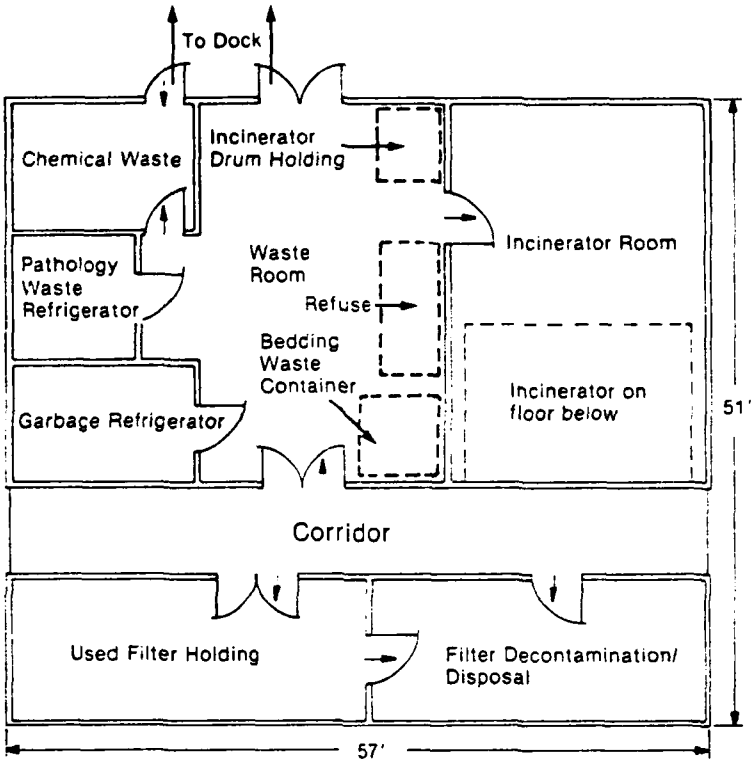
NO. 20

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 57 x 51 Ft.
Area: 2,907 Sq. Ft.
Ceiling Height _ 8' _ 9' X 13' _____
Air Flow: 9,000 CFM _ Variable
Air Changes/Hour: 14
Floor Drains: _ Capped _ Flushing X Other
Water: X Hot X Cold X None _ No _ Make-up
Central Vacuum Cleaning: X Yes _ No
Local Exhaust Filtration: _ Yes X No
Epoxy Coated: _ Walls _ Floors _ Ceilings
Sprinklers: _ Yes X No _ Halon _ Optional
_ Timed Lighting
X Compressed Air: _ Vacuum: _ Other Gases
_ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Incinerator conforms to requirements for disposal of hazardous materials
2. Storage areas provided for:
   - *Collecting wastes during incinerator charging*
   - Compatibility with waste pickup services

SPECIAL ASSUMPTIONS

1. Located adjacent to loading dock.
2. Waste bedding material delivered in sealed containers from treatment and cage washing areas.
3. Filters require different disposal methods than other wastes.
4. Pathological wastes and garbage require separate refrigerated storage areas.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	38	13
Heat, Vent., Air Cond.	23	8
Electrical	32	11
Sanitary	15	5
Equipment	330	114
Total	438	151

TITLE Non-radioactive Waste Handling/Disposal Area

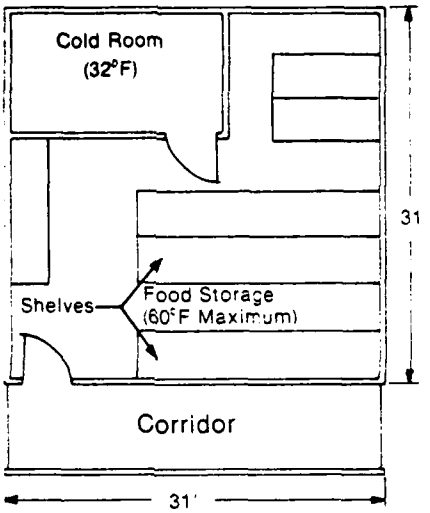
NO. 21

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 31 x 31 Ft.
Area: 961 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 1,000 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☐ No ☐ Halon ☒ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

Located near receiving area.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	11	11
Heat. Vent., Air Cond.	8	8
Electrical	9	9
Sanitary	2	2
Equipment	40	42
Total	70	72

TITLE Refrigerated Food Storage Area

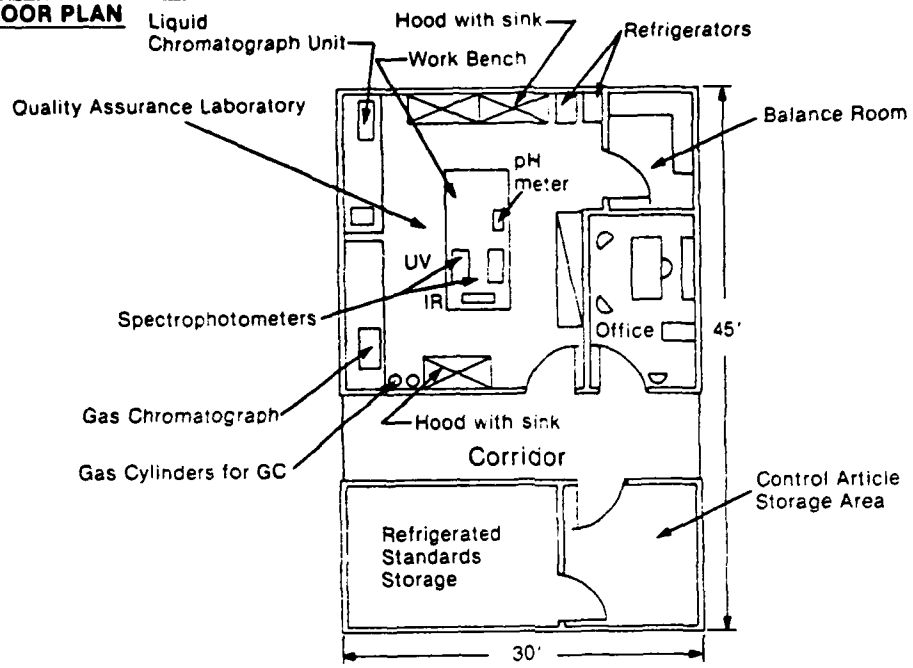
NO. 22

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 30 x 45 Ft.
Area: 1,350 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 1,000 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☐ No ☒ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air: ☒ Vacuum: ☐ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

HEPA and charcoal exhaust filter in central article storage area.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	18	13
Heat. Vent., Air Cond.	11	8
Electrical	15	11
Sanitary	7	5
Equipment	110	81
Total	161	118

TITLE Quality Assurance Laboratory

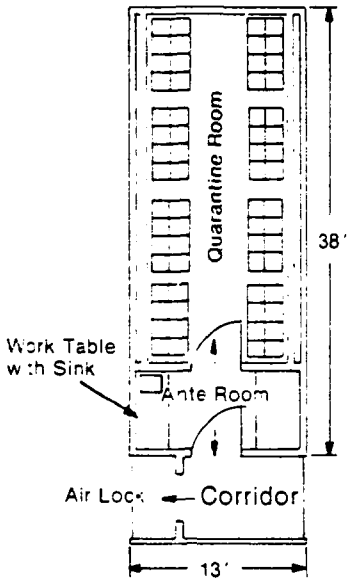
NO. 23

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 13 x 38 Ft.
Area: 494 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 1,250 CFM ☐ Variable
Air Changes/Hour: 17
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Ante room isolates corridor from contamination from animals and cages.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	12	25
Heat. Vent., Air Cond.	8	16
Electrical	9	19
Sanitary	4	8
Equipment	160	324
Total	193	392

TITLE

Animal Quarantine Area

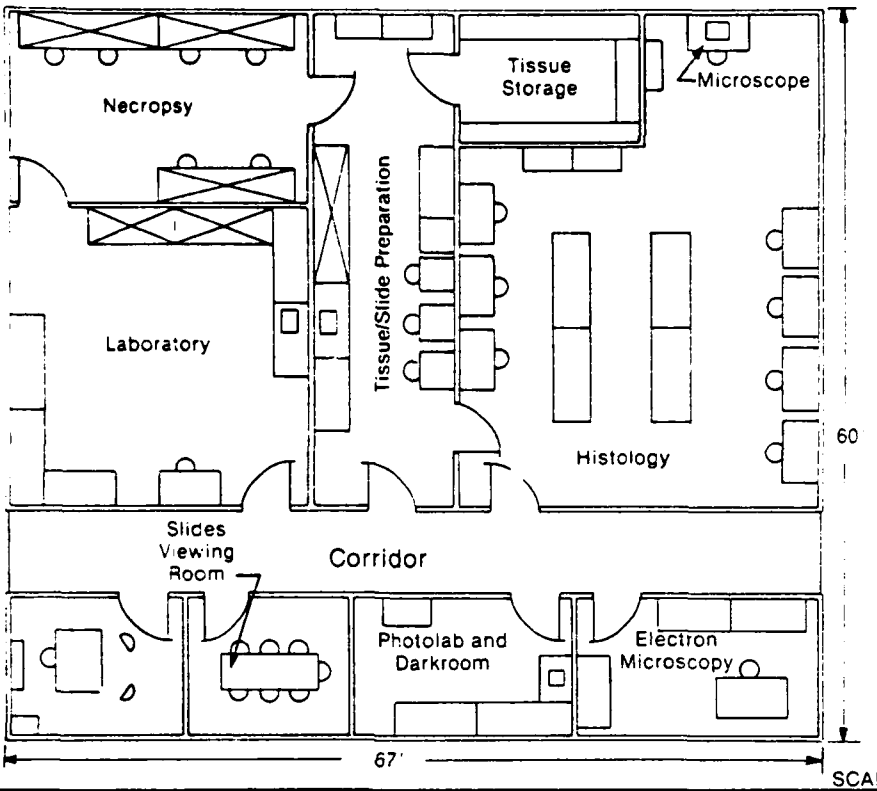
NO. 24

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 67 x 60 Ft.
Area: 4,020 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 9,000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air: ☒ Vacuum: ☒ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Laboratory sized for sacrificing large primates.
2. Capability for histopathology investigations with light or electron microscopy.
3. Capability for group viewing of slides.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	101	25
Heat. Vent., Air Cond.	64	16
Electrical	76	19
Sanitary	32	8
Equipment	340	85
Total	613	153

TITLE Pathology Laboratory

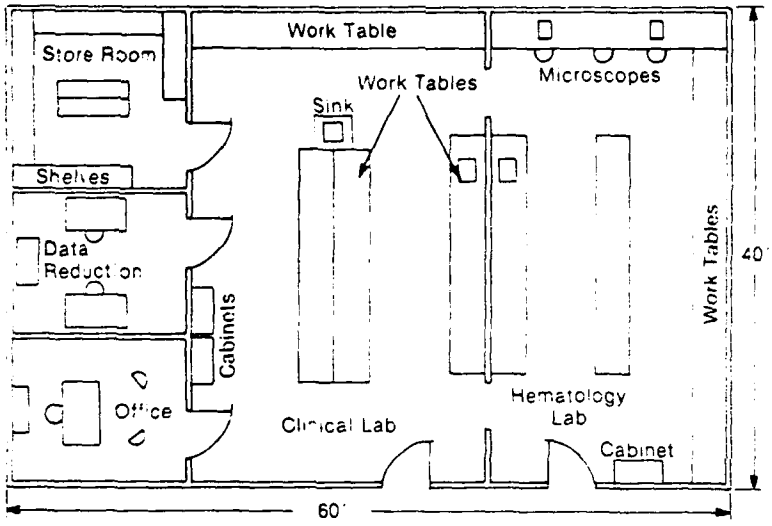
NO. 25

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 60 x 40 Ft.
Area: 2,400 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 1,800 CFM ☐ Variable
Air Changes Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air: ☒ Vacuum: ☒ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

1. Desirable to have local data reduction area.
2. Local store room required for frequently-used chemicals.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft
General Construction	60	25
Heat, Vent., Air Cond.	38	16
Electrical	46	19
Sanitary	19	8
Equipment	160	67
Total	323	135

TITLE Clinical Chemistry Laboratory

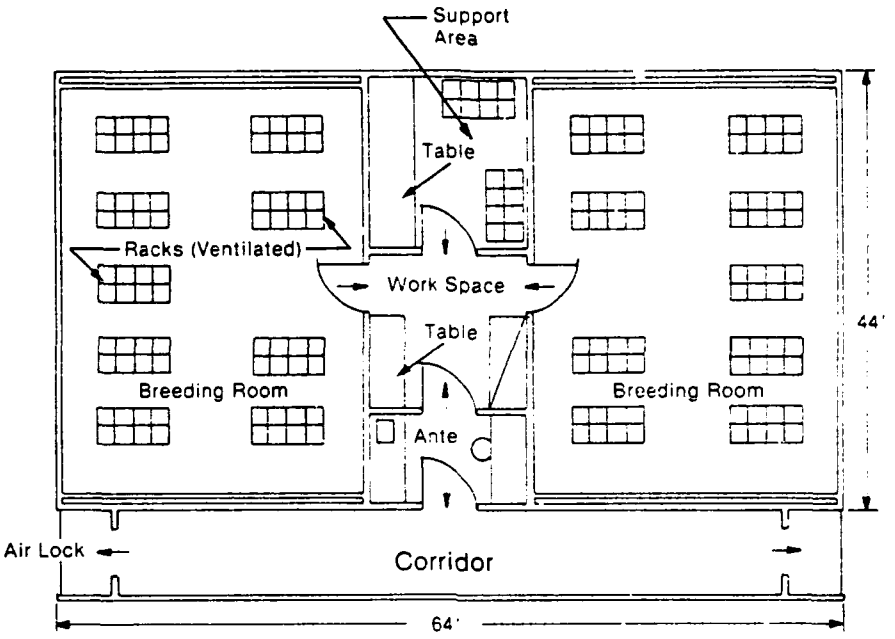
NO. 26

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 64 x 44 Ft.
Area: 2,816 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 6,000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Capability for separating two animal species provided.

SPECIAL ASSUMPTIONS

Support area may be used for teratology/reproduction studies.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	70	25
Heat, Vent., Air Cond.	45	16
Electrical	54	19
Sanitary	23	8
Equipment	130	46
Total	322	114

TITLE Animal Breeding Area

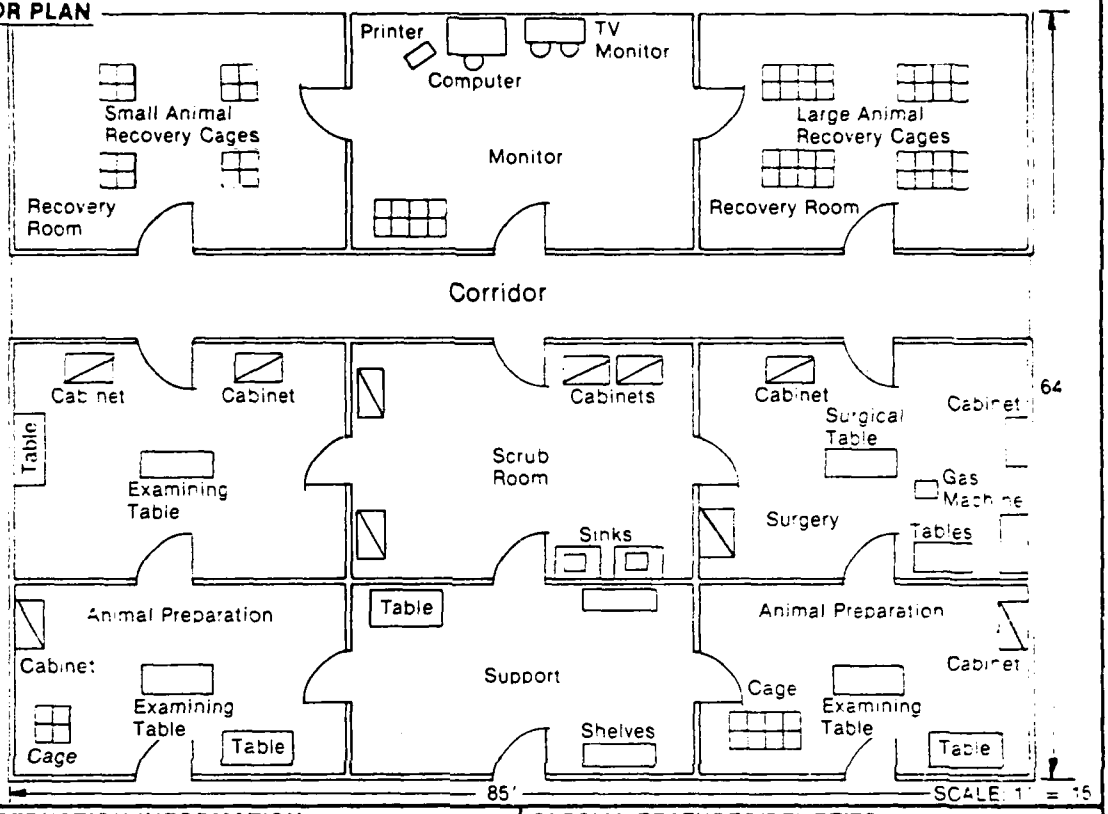
NO. 27

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



CONSTRUCTION INFORMATION

Dimensions: 85 x 64 Ft.
Area: 5,440 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 4,100 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air: ☒ Vacuum: ☒ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Capability for treating primates as well as smaller animals.
2. Dual preparation and recovery rooms may be used to separate primates from other animals, or to separate baboons from monkeys, etc.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	136	25
Heat, Vent., Air Cond.	87	16
Electrical	103	19
Sanitary	44	8
Equipment	100	18
Total	470	86

TITLE Veterinary Medicine Area

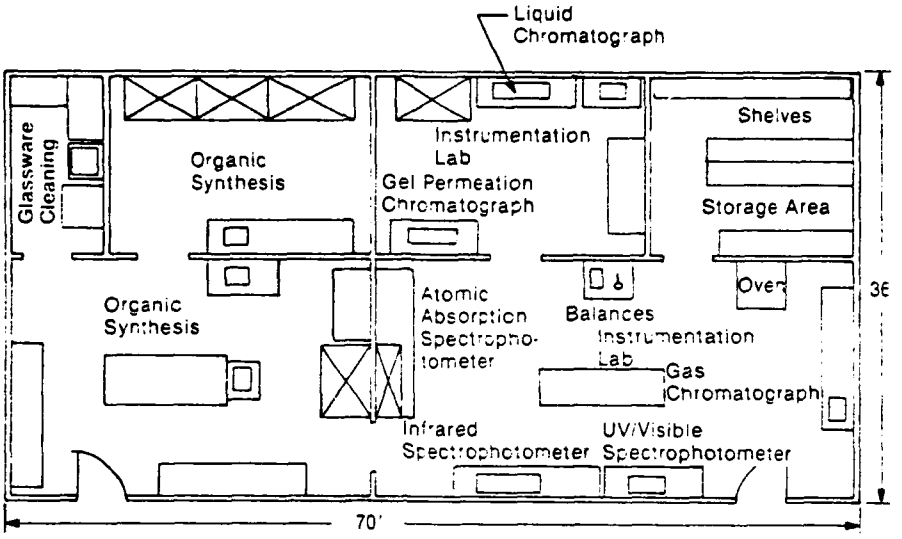
NO. 28

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 70 x 36 Ft.
Area: 2,520 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 2,650 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☒ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air; ☒ Vacuum, ☒ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Exposure of instrumentation to solvent vapors minimized through separation of balances and spectrophotometers from liquid chromatograph.
2. Small organic synthesis lab. with three hoods, provided for potentially hazardous work

SPECIAL ASSUMPTIONS

1. Desirable to have local storage area for frequently used chemicals.
2. Desirable to have local glassware cleaning area because of large amount of delicate glassware used.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	63	25
Heat. Vent.. Air Cond.	40	16
Electrical	48	19
Sanitary	20	8
Equipment	200	79
Total	371	147

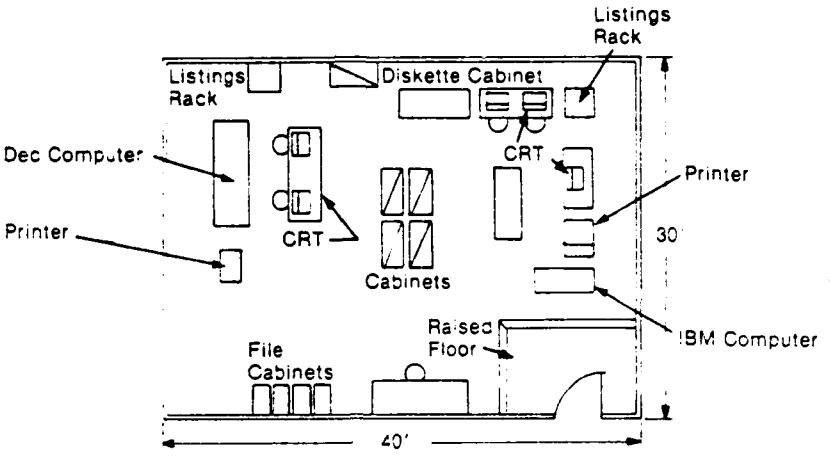
TITLE Analytical/Synthetic Chemistry Laboratory — **NO.** 29

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 40 x 30 Ft.
Area: 1,200 Sq. Ft.
Ceiling Height ☒ 8' ☐ 9' ☐ 13' ☐ _____
Air Flow: 800 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☐ No ☒ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Raised floor over electrical cables provides better safety and cleanliness.
2. Storage cabinets and racks provided for diskettes, manuals and program listings.

SPECIAL ASSUMPTIONS

1. Separate computer systems used for data storage/reduction (DEC) and management/business data (IBM).

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	12	10
Heat, Vent., Air Cond.	8	7
Electrical	16	13
Sanitary	6	5
Equipment	1,100	917
Total	1,142	952

TITLE Automated Data Processing Area

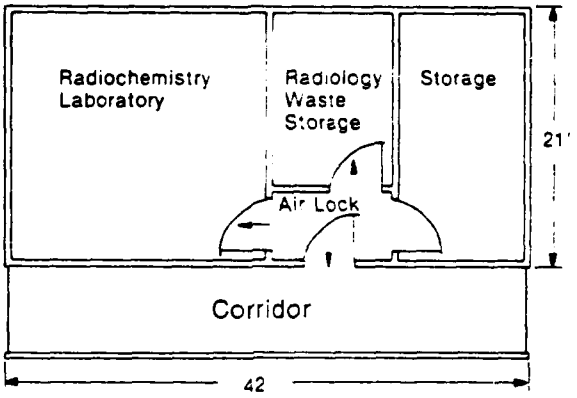
NO. 30

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 42 x 21 Ft.
Area: 882 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 2.000 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☐ No ☐ Halon ☒ Optional
☐ Timed Lighting
☒ Compressed Air: ☒ Vacuum: ☒ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Air lock isolates corridor for protection against accidental contamination.

SPECIAL ASSUMPTIONS

Desirable to separate radiology wastes from other radiochemistry materials.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	22	25
Heat. Vent., Air Cond.	14	16
Electrical	17	19
Sanitary	7	8
Equipment	200	227
Total	260	295

TITLE Radiochemistry Laboratory

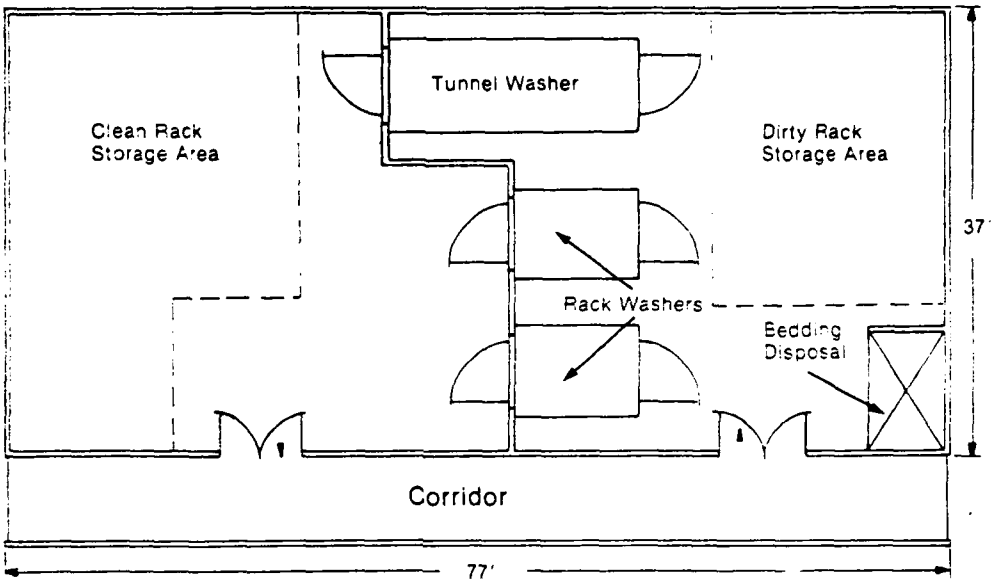
NO. 31

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 77 x 37 Ft.
Area: 2,849 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 8,000 CFM ☐ Variable
Air Changes/Hour: 13
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☐ No ☐ Halon ☒ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

If clean/dirty corridor system used, a separate corridor would lead to each room.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	71	25
Heat, Vent., Air Cond.	46	16
Electrical	54	19
Sanitary	23	8
Equipment	93	33
Total	287	101

TITLE

Cage/Rack Washing and Storage Area

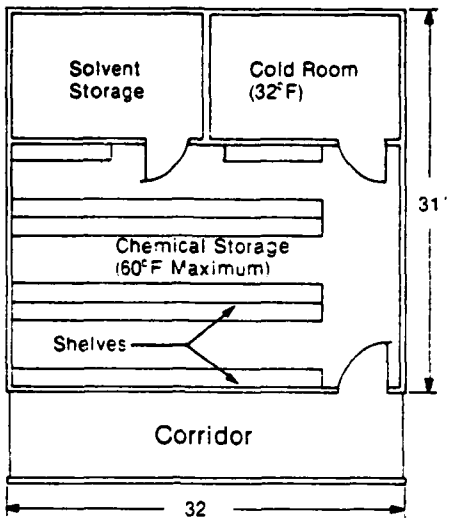
NO. 32

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 32 x 31 Ft.
Area: 992 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 1,000 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum; ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None

SPECIAL ASSUMPTIONS

1. Located near receiving area.
2. Solvent storage area vented to exterior of building.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	11	11
Heat. Vent., Air Cond.	8	8
Electrical	9	9
Sanitary	2	2
Equipment	16	16
Total	46	46

TITLE Chemical Storage Area

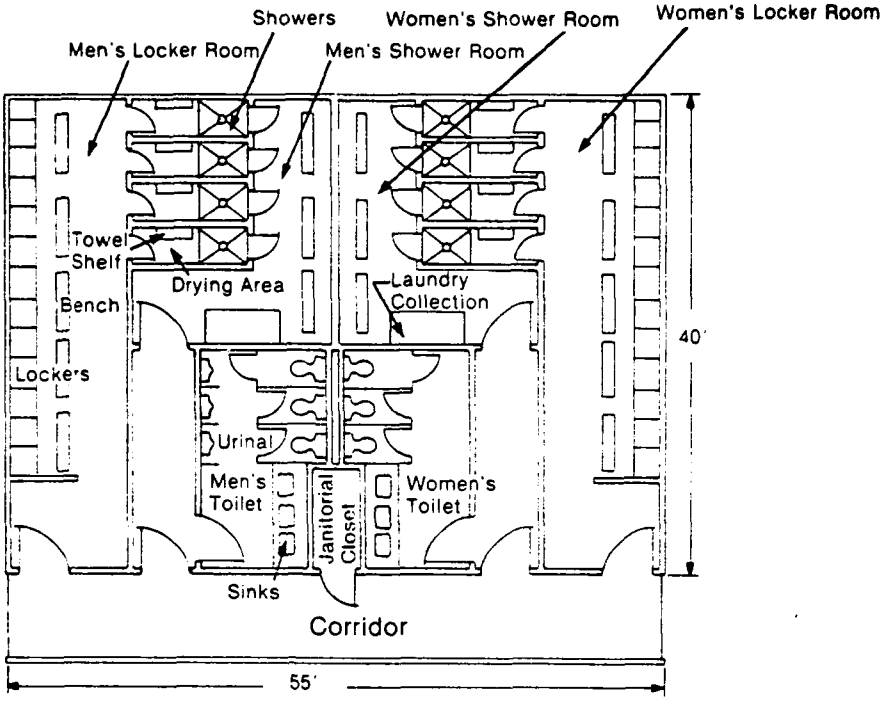
NO. 33

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 55 x 40 Ft.
Area: 2,200 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 3,300 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Compatible with clean/dirty corridor system.
2. Showers separate clean and dirty areas.
3. Provisions for handicapped personnel.

SPECIAL ASSUMPTIONS

Corridor allows access to exits without passing through contaminated areas.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	29	13
Heat, Vent., Air Cond.	18	8
Electrical	24	11
Sanitary	11	5
Equipment	10	5
Total	92	42

TITLE

Showers, Lockers and Toilets Area

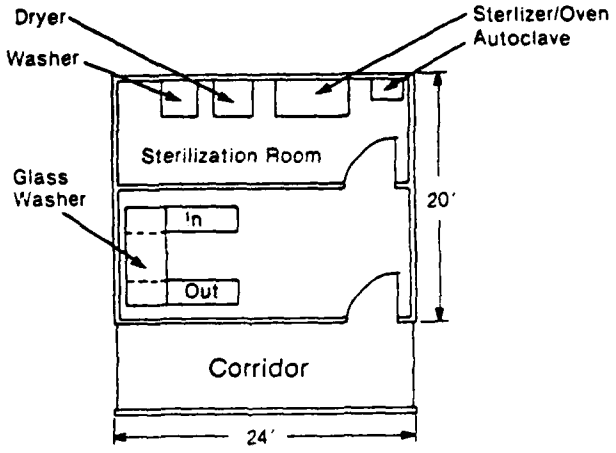
NO. 34

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 24 x 20 Ft.
Area: 480 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 1,100 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☒ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Separate rooms confine heat from sterilization room.

SPECIAL ASSUMPTIONS

Located conveniently in relation to sources of dirty glassware.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	12	25
Heat, Vent., Air Cond.	8	16
Electrical	9	19
Sanitary	4	8
Equipment	25	52
Total	58	120

TITLE Glassware Washing Area

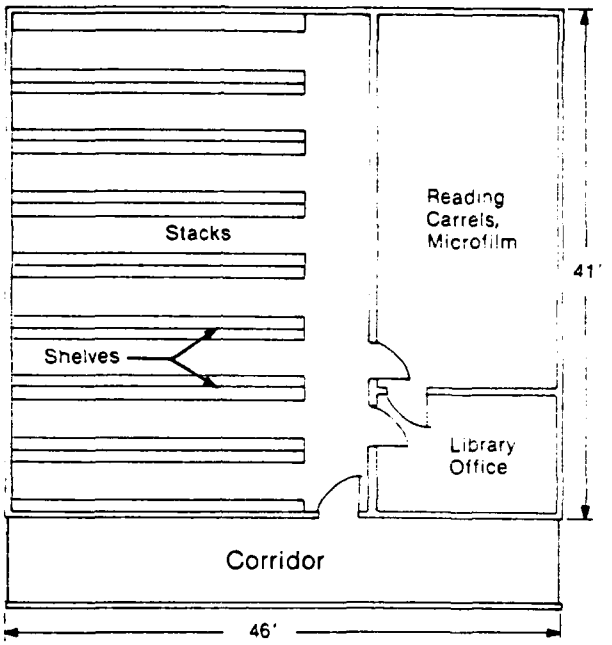
NO. 35

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 46 x 41 Ft.
Area: 1,886 Sq. Ft.
Ceiling Height: 8 [X] 9 13 _____
Air Flow: 1,500 CFM Variable
Air Changes/Hour: 5
Floor Drains: Capped Flushing Other
Water: Hot Cold [X] None No Make-up
Central Vacuum Cleaning: Yes [X] No
Local Exhaust Filtration: Yes [X] No
Epoxy Coated: Walls Floors Ceilings
Sprinklers: [X] Yes No Halon Optional
Timed Lighting
Compressed Air: Vacuum: Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

Microfilm document storage system used.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	19	10
Heat, Vent., Air Cond.	15	8
Electrical	23	12
Sanitary	8	4
Equipment	6	3
Total	71	37

TITLE Library Area

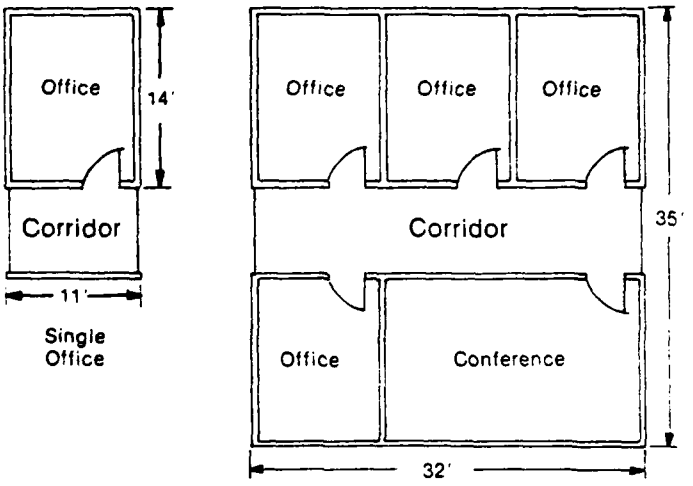
NO. 36

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PL



Group of Four Offices
with Conference Room

SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 32 x 35 Ft.
Area: 1,120 Sq. Ft.
Ceiling Height ☒ 8' ☐ 9' ☐ 13' ☐ _____
Air Flow: 1,500 CFM ☐ Variable
Air Changes/Hour: 10
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

1. Offices apart from research areas required or desirable for some technical staff.
2. One conference room provided for every 20 offices. Two single offices would replace conference room in those additional modules.
3. Technical office areas may be located at various locations, close to laboratory areas.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	11	10
Heat. Vent., Air Cond.	9	8
Electrical	13	12
Sanitary	4	4
Equipment	8	7
Total	45	41

TITLE
Technical Offices Area

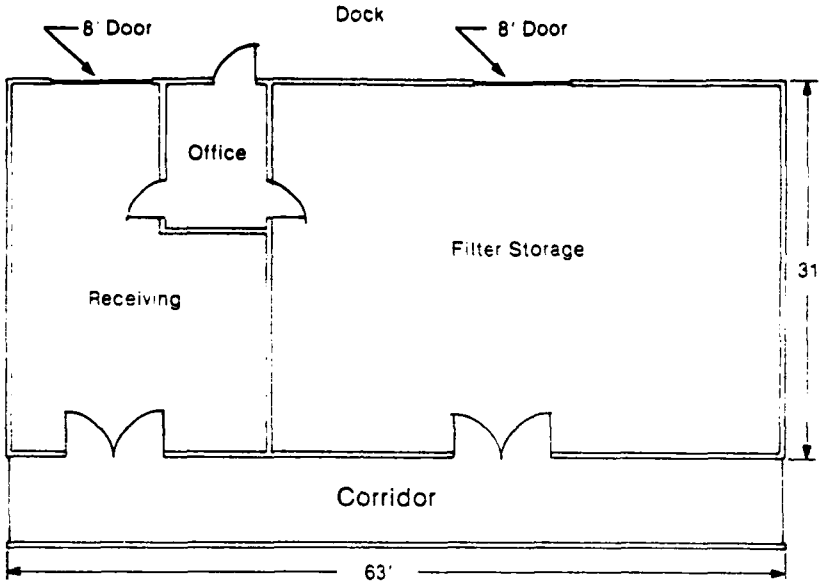
NO. 37

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 63 x 31 Ft.
Area: 1,953 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 1,500 CFM ☐ Variable
Air Changes/Hour: 4
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☒ Yes ☐ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

Located adjacent to loading dock.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	21	11
Heat. Vent., Air Cond.	14	7
Electrical	18	9
Sanitary	0	0
Equipment	5	3
Total	58	30

TITLE Shipping and Receiving Area

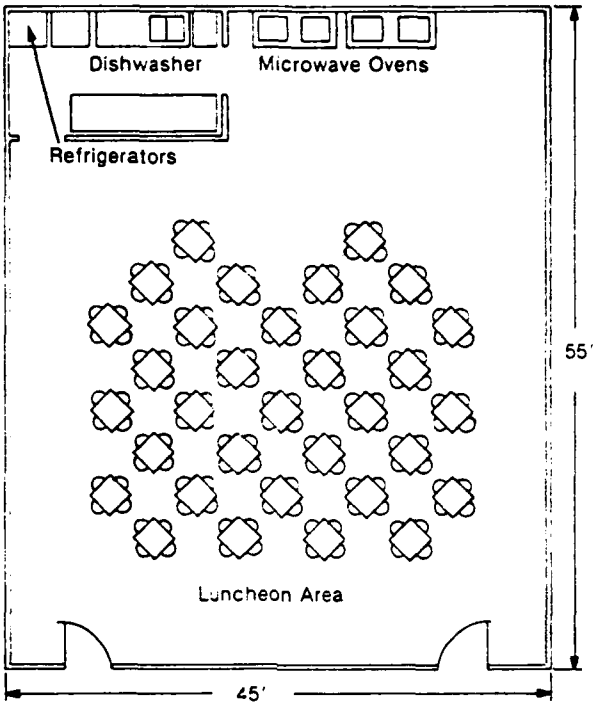
NO. 38

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 45 x 55 Ft.
Area: 2,475 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐_____
Air Flow: 1,860 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☐ No ☐ Halon ☒ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Refrigerators, single and dishwasher provided for use by personnel. These items located in separate room for esthetics.

2. Microwave ovens provided for personnel use, but located where they are readily accessible.

SPECIAL ASSUMPTIONS

Capacity required is 130 persons.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	32	13
Heat, Vent., Air Cond.	20	8
Electrical	27	11
Sanitary	12	5
Equipment	3	1
Total	94	38

TITLE Luncheon Room Area

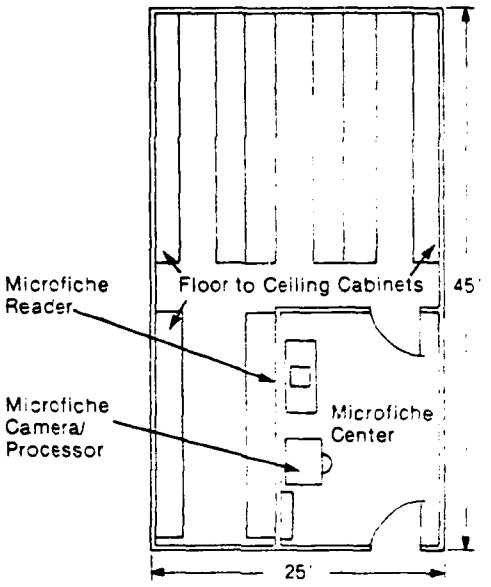
NO. 39

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 25 x 45 Ft.
Area: 1.125 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 2.530 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air: ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower Eye Wash

SPECIAL FEATURES/BENEFITS

Microfilm-based storage system maximizes storage capacity, control of records and accessibility of information.

SPECIAL ASSUMPTIONS

Microfilm record storage system will be used.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	12	11
Heat. Vent., Air Cond.	9	8
Electrical	10	9
Sanitary	2	2
Equipment	24	21
Total	57	51

TITLE Record Archives Area

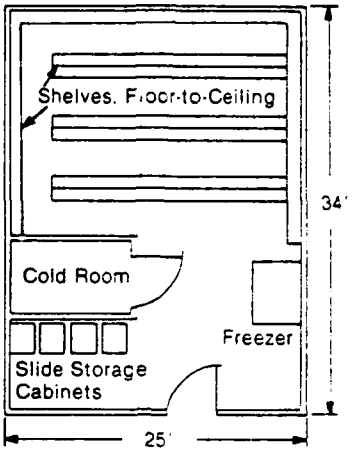
NO. 40

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 25 x 34 Ft.
Area: 850 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 3,000 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optical
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Freezer provided for storage of cultures.
2. Cold room provided for storage of tissue samples not in preservatives.
3. Shelves provided for preserved tissue samples (7,824 ft³ of storage space).
4. Cabinets provided for storage of slides.

SPECIAL ASSUMPTIONS

Capacity of preserved tissue storage area is 6 years of testing, based on:

- Samples from 100 animals occupies about 1 ft³.
- Storage space required per year for all modules operating at 50% maximum animal testing rate is 1,300 ft³.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	9	11
Heat, Vent., Air Cond.	7	8
Electrical	8	9
Sanitary	2	2
Equipment	3	4
Total	29	34

TITLE Specimen Storage Area

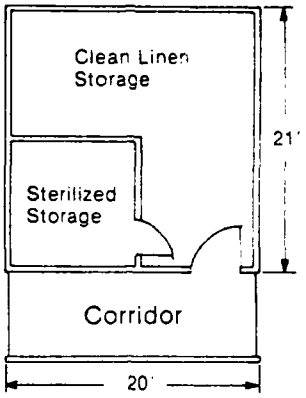
NO. 41

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 20 x 21 Ft.
Area: 420 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____.
Air Flow: 500 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Sterlized linen remains sterile longer in separate storage area.

SPECIAL ASSUMPTIONS

Located conveniently near laundry.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	5	11
Heat. Vent., Air Cond.	3	8
Electrical	4	9
Sanitary	1	2
Equipment	1	2
Total	14	32

TITLE: Linen Storage Area

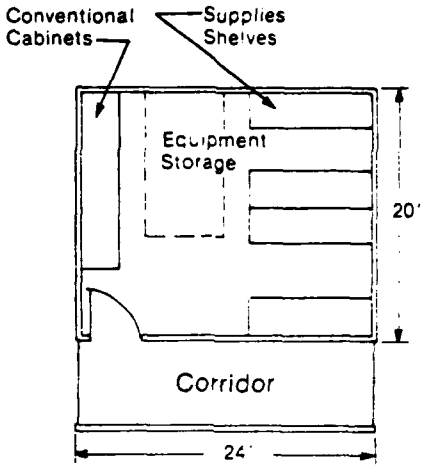
NO.: 42

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 24 x 20 Ft.
Area: 480 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 500 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum; ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

Central storage area required to support smaller janitor's closets located throughout facility.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	6	13
Heat, Vent., Air Cond.	4	8
Electrical	5	11
Sanitary	2	5
Equipment	1	2
Total	18	39

TITLE Janitorial Storage Area

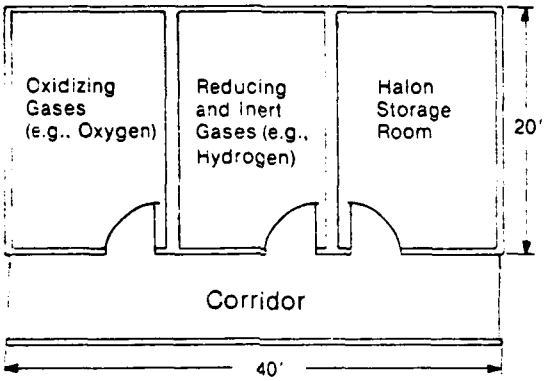
NO. 43

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 40 x 20 Ft.
Area: 800 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: _____ CFM ☒ Variable
Air Changes/Hour: _____
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Increased safety through separation of oxidizing and reducing gases.

SPECIAL ASSUMPTIONS

1. Located near outside storage tanks (e.g., nitrogen), if used.
2. Storage rooms vented to exterior of building.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	9	11
Heat, Vent., Air Cond.	6	7
Electrical	7	9
Sanitary	0	0
Equipment	3	4
Total	25	31

TITLE Central Cylinder Gas Storage Area

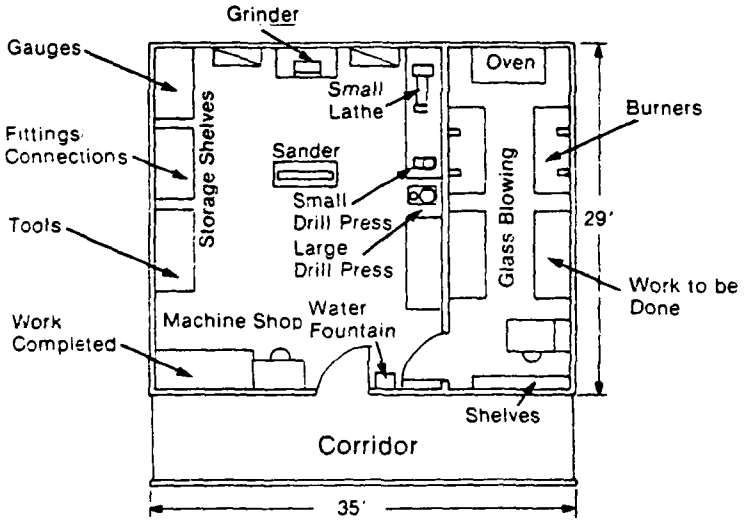
NO. 44

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 35 x 29 Ft.
Area: 1,015 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 1,100 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☒ Compressed Air: ☒ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	11	11
Heat, Vent., Air Cond.	8	8
Electrical	9	9
Sanitary	2	2
Equipment	5	5
Total	35	35

TITLE Equipment Maintenance Area

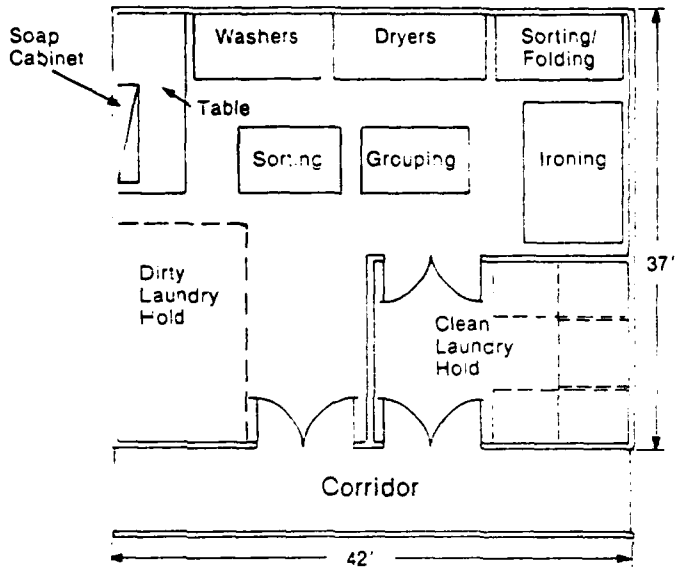
NO. 45

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 42 x 37 Ft.
Area: 1,554 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 2,500 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

None.

SPECIAL ASSUMPTIONS

1. Clean linen holding area required to minimize frequency of trips to Linen Storage Area (No. 42).
2. Primary use of Laundry Area is cleaning of non-disposable personnel garments

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	17	11
Heat, Vent., Air Cond.	12	8
Electrical	14	9
Sanitary	3	2
Equipment	2	1
Total	48	31

TITLE Laundry Area

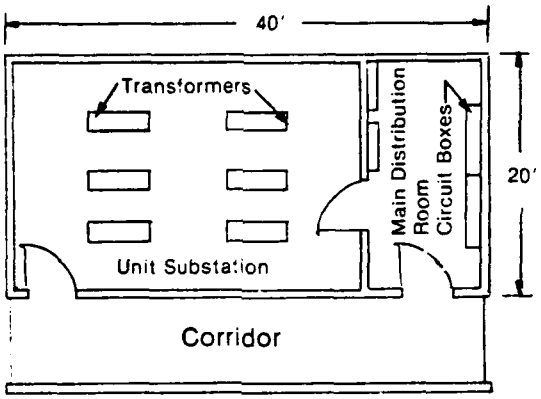
NO. 46

F-650 (2/15/81)

MAMMALiAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 40 x 20 Ft.
Area: 800 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 1,200 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Acoustic insulation in walls.

SPECIAL ASSUMPTIONS

Transformers required to be inside facility.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	9	11
Heat. Vent., Air Cond.	6	7
Electrical	7	9
Sanitary	0	0
Equipment	120	150
Total	142	177

TITLE

Central Power Area

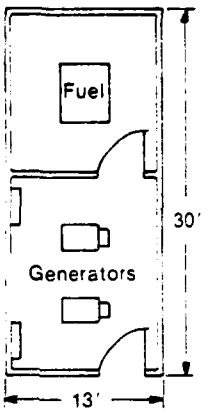
NO. 47

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 13 x 30 Ft.
Area: 390 Sq. Ft.
Ceiling Height: ☐ 8 ☐ 9' ☒ 13' ☐ _____
Air Flow: 590 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air: ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Access to equipment from all sides for efficient maintenance.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	4	11
Heat. Vent., Air Cond.	3	7
Electrical	4	9
Sanitary	0	0
Equipment	330	846
Total	341	873

TITLE Central Standby (Emergency) Power Area

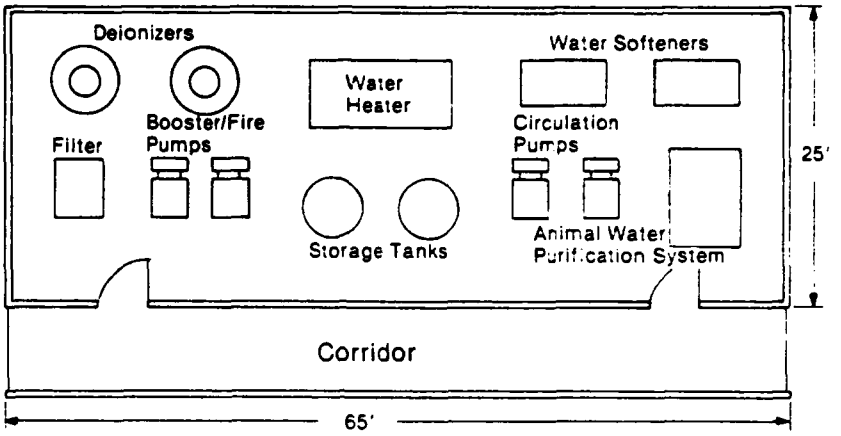
NO. 48

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 65 x 25 Ft.
Area: 1,625 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 1,800 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☒ Cold ☐ None ☐ No ☒ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Acoustic insulation in walls.
2. Centralized animal water purification system.

SPECIAL ASSUMPTIONS

Purified water piped to all animal rooms.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	18	11
Heat. Vent., Air Cond.	13	8
Electrical	15	9
Sanitary	3	2
Equipment	128	79
Total	177	109

TITLE Central Water Supply Conditioning Area

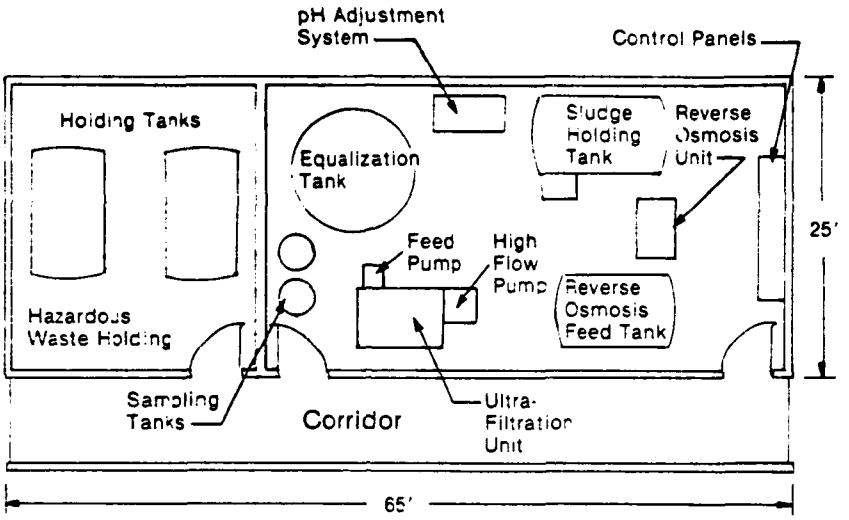
NO. 49

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 65 x 25 Ft.
Area: 1,625 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 2,500 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☒ Cold ☐ None ☐ No ☒ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Ha'or ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Acoustic insulation in walls.
2. Hazardous wastes can be held for outside processing.

SPECIAL ASSUMPTIONS

1. Special drainage system for exposure rooms allows separation of hazardous waste water.
2. Treatment will meet or exceed local code requirements.
3. Located in basement at sanitary sewer entrance point.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	18	11
Heat, Vent., Air Cond.	13	8
Electrical	15	9
Sanitary	3	2
Equipment	800	492
Total	849	522

TITLE
Central Wastewater Conditioning Area

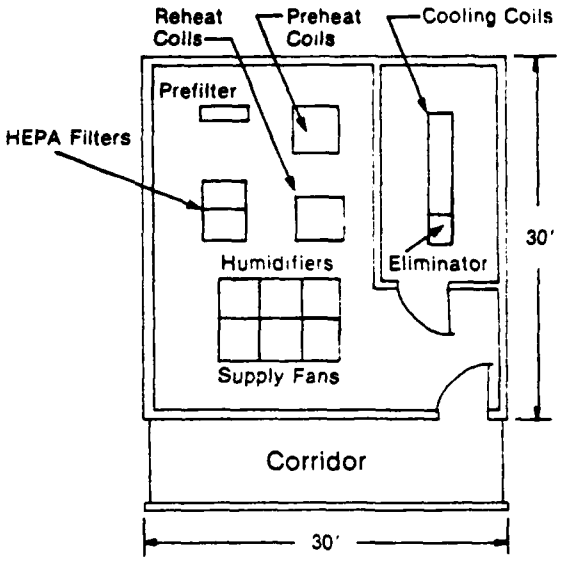
NO. 50

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 30 x 30 Ft.
Area: 900 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 975 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Acoustic insulation in walls.
2. Cooling coils isolated from heating coils to improve efficiency.
3. Multiple supply fans allow:
   - Various required air flows to different areas
   - Isolated air supply for exposure areas
   - Separate air supply for exposure chambers
4. Redundant HEPA filters insure clean air delivery and allow filter changes without interrupting air flow.

SPECIAL ASSUMPTIONS

1. Steam for humidification does not contain corrosion preventing additives.
2. Exhaust air handled by fans in appropriate locations.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	10	11
Heat, Vent., Air Cond.	7	8
Electrical	8	9
Sanitary	2	2
Equipment	400	444
Total	427	474

TITLE Central Air Handling Area

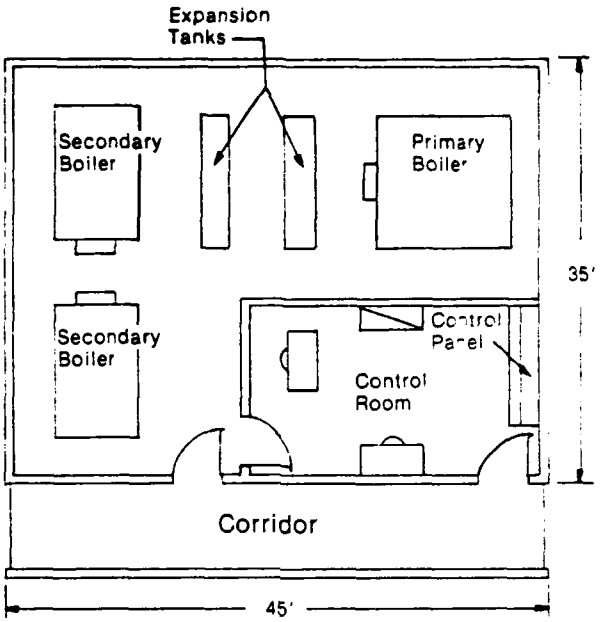
NO. 51

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 45 x 35 Ft.
Area: 1,575 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐_____
Air Flow: 1,700 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☒ Cold ☐ None ☐ No ☒ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Acoustic insulation in walls.
2. Secondary boilers provide backup heating.

SPECIAL ASSUMPTIONS

1. No outside source of steam for heating.
2. Fuel tanks buried outdoors.
3. Located in basement.
4. Boilers require chimney to roof.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	17	11
Heat. Vent., Air Cond.	13	8
Electrical	14	9
Sanitary	3	2
Equipment	160	102
Total	207	132

TITLE Central Heating Area

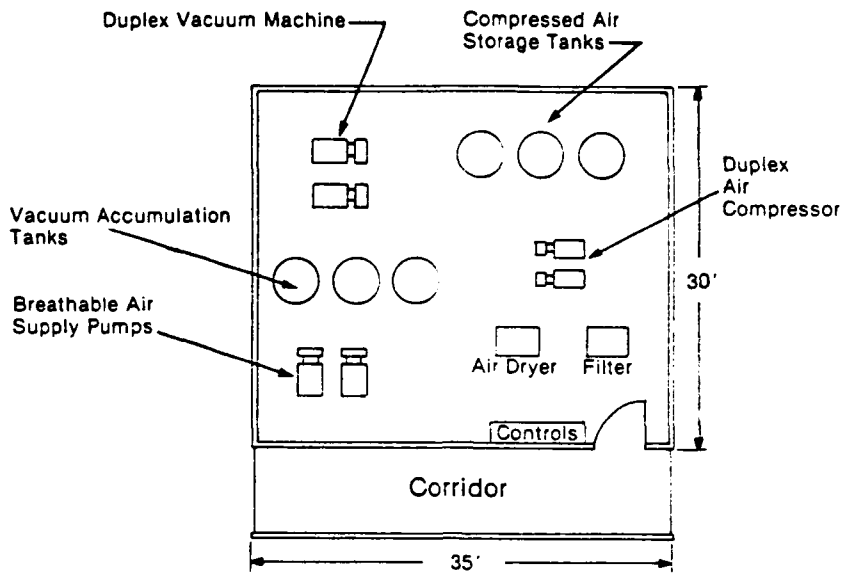
NO. 52

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 35 x 30 Ft.
Area: 1,050 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 1,600 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☒ Yes ☐ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Acoustic insulation in walls.
2. Breathable air supplied to exposure rooms for safety of personnel.
3. Furnishes compressed air and vacuum for laboratories.
4. Water seal machines for oil-free air.

SPECIAL ASSUMPTIONS

None.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	12	11
Heat. Vent., Air Cond.	8	8
Electrical	9	9
Sanitary	2	2
Ecuipment	5	5
Total	36	35

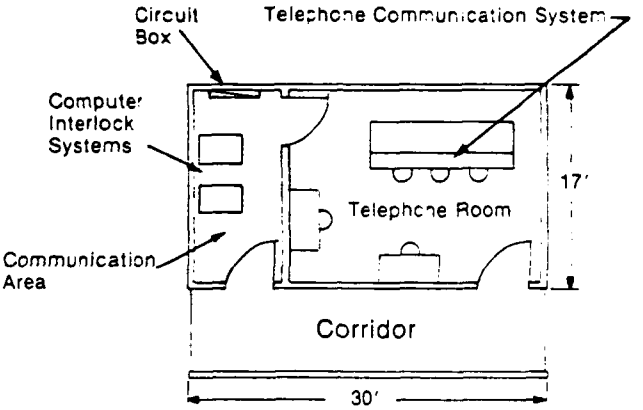
TITLE	NO.
Central Compressed Air/Vacuum Area	53

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 30 x 17 Ft.
Area: 510 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 400 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☐ None ☒ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Acoustic insulation in walls and ceilings.

SPECIAL ASSUMPTIONS

Proximity to Automated Data Processing Area.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	6	11
Heat. Vent., Air Cond.	4	8
Electrical	5	9
Sanitary	1	2
Equipment	45	88
Total	61	118

TITLE

Central Communications Area

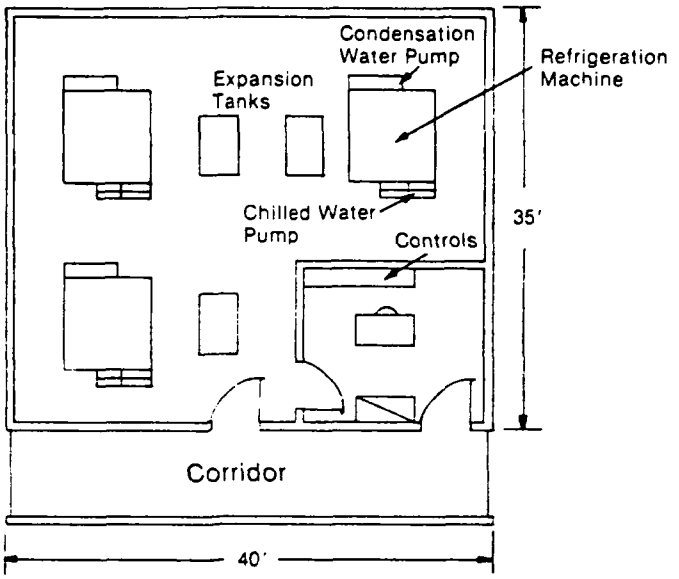
NO. 54

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 40 x 35 Ft.
Area: 1,400 Sq. Ft.
Ceiling Height ☐ 8' ☐ 9' ☒ 13' ☐ _____
Air Flow: 1,500 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☐ Cold ☐ None ☐ No ☒ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Walls have acoustic insulation.

SPECIAL ASSUMPTIONS

1. No outside source of chilled water.
2. Cooling towers located at remote location.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	15	11
Heat, Vent., Air Cond.	11	8
Electrical	13	9
Sanitary	3	2
Equipment	610	436
Total	652	466

TITLE Central Refrigeration Area

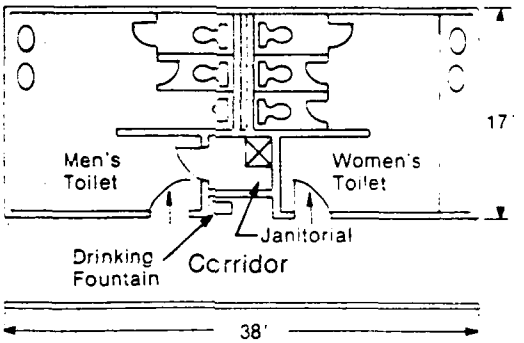
NO. 55

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 38 x 17 Ft.
Area: 646 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 1,000 CFM ☐ Variable
Air Changes/Hour: 10
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☒ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Provisions made for handicapped personnel.

SPECIAL ASSUMPTIONS

Located conveniently near work areas, population centers.

COST ESTIMATE

	Total $ 000)	Resulting $/Sq. Ft.
General Construction	8	13
Heat. Vent., Air Cond.	5	8
Electrical	7	11
Sanitary	3	5
Equipment	3	5
Total	26	42

TITLE

Central Toilet Area

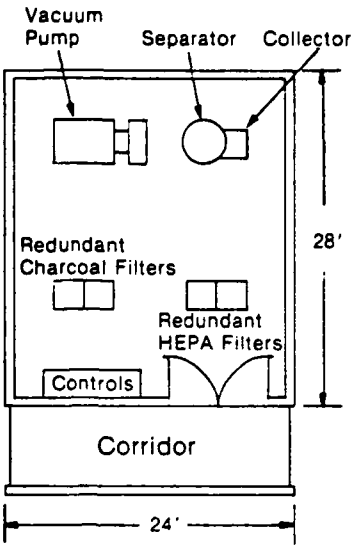
NO. 56

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 24 x 28 Ft.
Area: 672 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 700 CFM ☐ Variable
Air Changes/Hour: 7
Floor Drains: ☐ Capped ☐ Flushing ☒ Other
Water: ☐ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☒ Yes ☐ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Acoustic insulation in walls and ceiling.

SPECIAL ASSUMPTIONS

1. One vacuum cleaning area per floor.
2. Separate system for animal rooms.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	7	11
Heat, Vent., Air Cond.	5	8
Electrical	6	9
Sanitary	1	2
Equipment	45	67
Total	64	97

TITLE Central Vacuum Cleaning Area

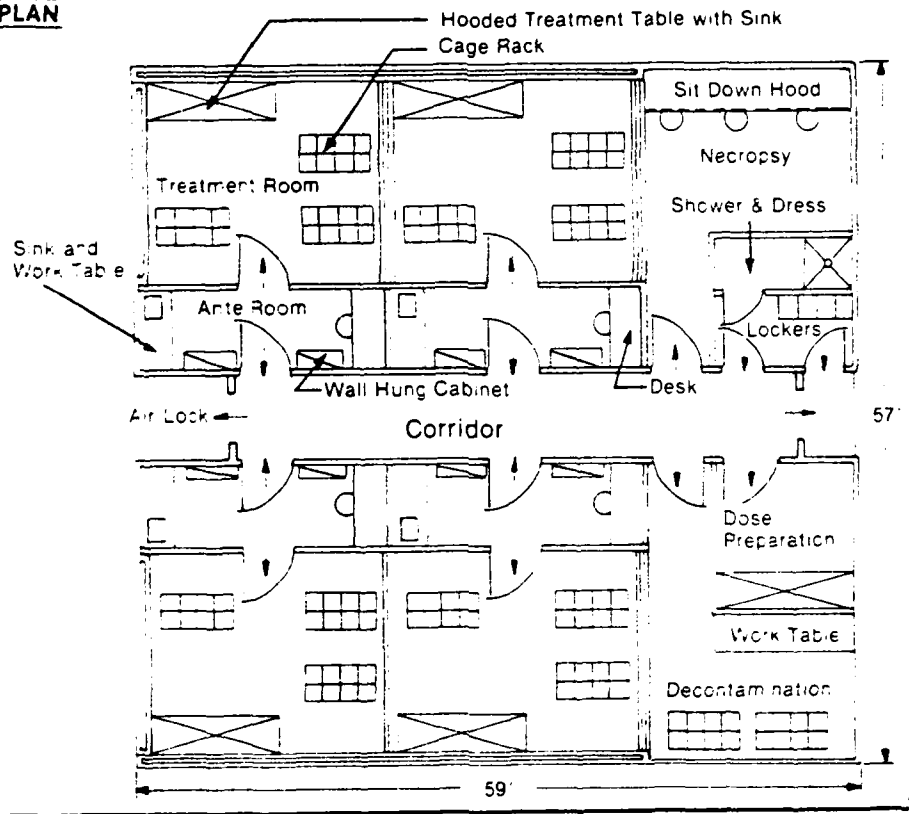
NO. 57

F-650 (2/15/81)

Life Systems

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

FLOOR PLAN



CONSTRUCTION INFORMATION

Dimensions: 59 x 57 Ft.
Area: 3,363 Sq. Ft.
Ceiling Height: ☐ 8 ☒ 9 ☐ 13' ☐ _____
Air Flow: 7,500 CFM ☐ Variable
Air Changes Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☒ Timed Lighting
☐ Compressed Air: ☐ Vacuum: ☐ Other Gases
☐ Emergency Shower Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously
2. Compatible with highly hazardous tests
   - Ante room isolates corridor
   - Local dose preparation
   - Local necropsy
   - Local cage rack decontamination

SPECIAL ASSUMPTIONS

1. Safety considerations require local necropsy and dose preparation.

COST ESTIMATE

	Total $ 000)	Resulting $ Sq. Ft.
General Construction	84	25
Heat. Vent. Air Cond.	54	16
Electrical	64	19
Sanitary	27	8
Equipment	65	19
Total	294	87

TITLE Dermal Testing Area, Rodent

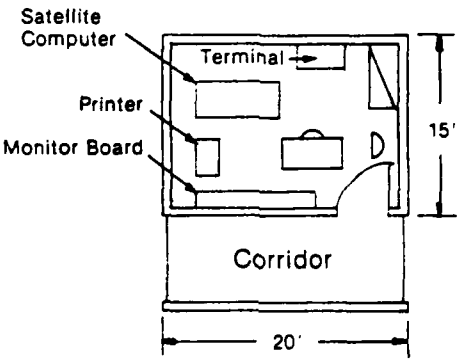
NO. 58

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 20 x 15 Ft.
Area: 300 Sq. Ft.
Ceiling Height ☒ 8' ☐ 9' ☐ 13' ☐ _____
Air Flow: 200 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☒ Yes ☐ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air: ☐ Vacuum: ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL ASSUMPTIONS

Located near central heating and refrigeration areas.

SPECIAL FEATURES/BENEFITS

1. Computerized central control and monitoring of ambient conditions.
2. Automatic record warning of temperature or humidity excursions during tests.
3. Accustic insulation in walls and ceiling.

COST ESTIMATE

	Total $(000)	Resulting $/Sq Ft
General Construction	3	10
Heat. Vent.. Air Cond.	2	7
Electrical	4	13
Sanitary	2	5
Equipment	47	157
Total	58	192

TITLE Central Automated Facility Systems Control Area

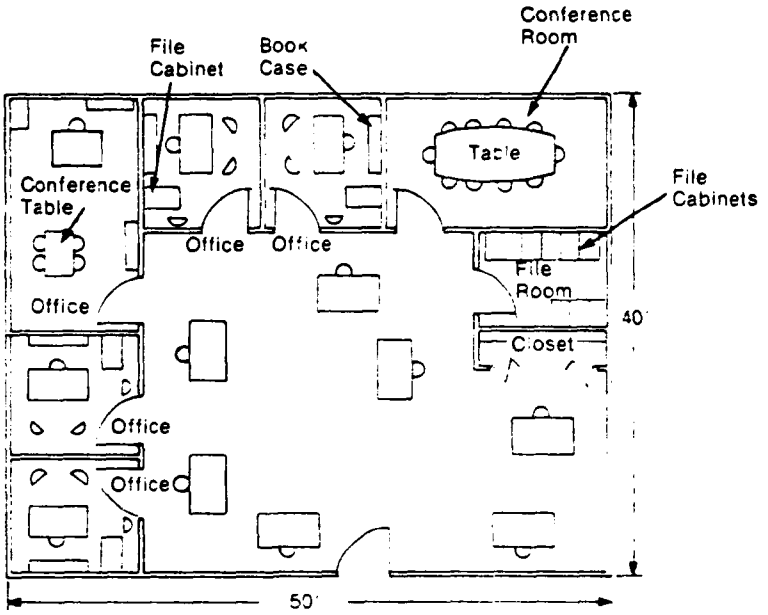
NO. 59

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 50 x 40 Ft.
Area: 2,000 Sq. Ft.
Ceiling Height ☒ 8' ☐ 9' ☐ 13 ☐ _____
Air Flow: 1,300 CFM ☐ Variable
Air Changes/Hour: 5
Floor Drains: ☐ Capped ☐ Flushing ☐ Other
Water: ☐ Hot ☐ Cold ☒ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☐ Yes ☒ No
Epoxy Coated: ☐ Walls ☐ Floors ☐ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Ha on ☐ Optional
Timed Lighting
Compressed Air: ☐ Vacuum: ☐ Other Gases
Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Acoustic insulation in walls and ceiling.

SPECIAL ASSUMPTIONS

One conference room for every 20 offices. Two single offices would replace conference room in these additional modules.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	20	10
Heat. Vent., Air Cond.	16	8
Electrical	24	12
Sanitary	8	4
Equipment	8	4
Total	76	38

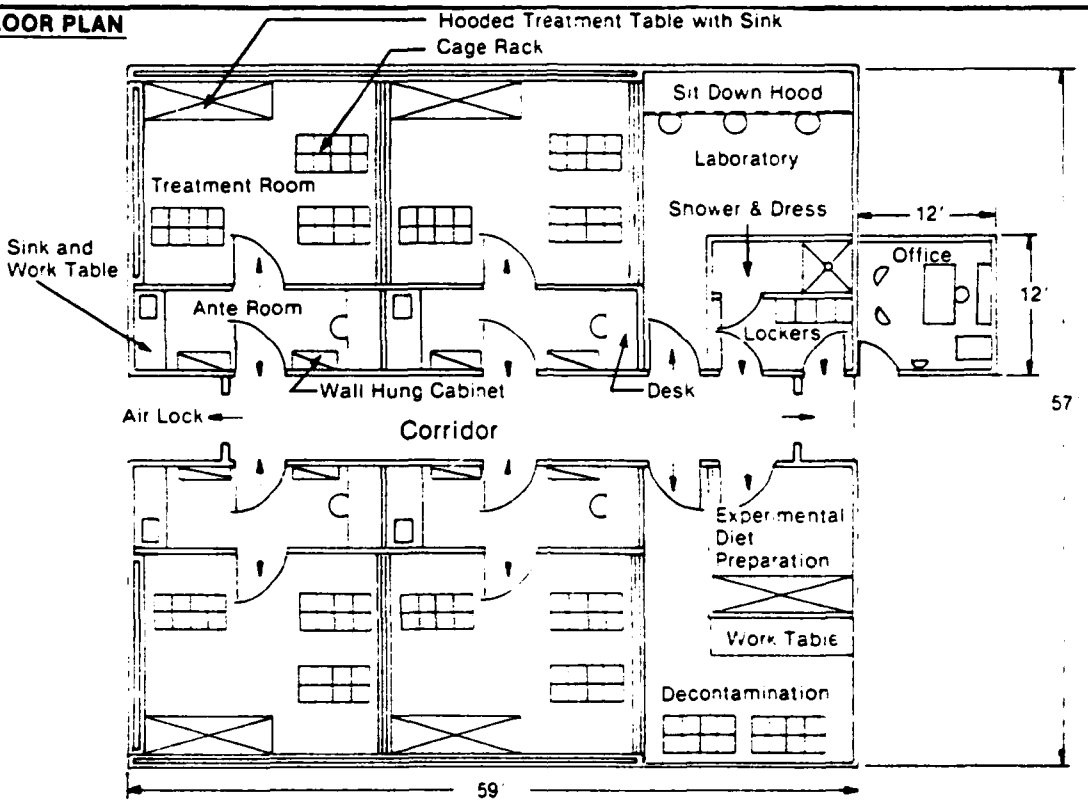
TITLE	NO.
Administrative Offices Area	60

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 59 x 57 Ft. and 12 x 12 Ft. Ft.
Area: 3,507 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 7,900 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Can test four chemicals simultaneously.
2. Capability for highly hazardous tests:
   - Ante room isolates corridor
   - Local diet preparation
   - Local laboratory area
   - Local decontamination

SPECIAL ASSUMPTIONS

Laboratory area could be used for necropsy work.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	88	25
Heat, Vent., Air Cond.	56	16
Electrical	67	19
Sanitary	28	8
Equipment	124	35
Total	363	103

TITLE

Neurotoxicology Studies Area, Chicken

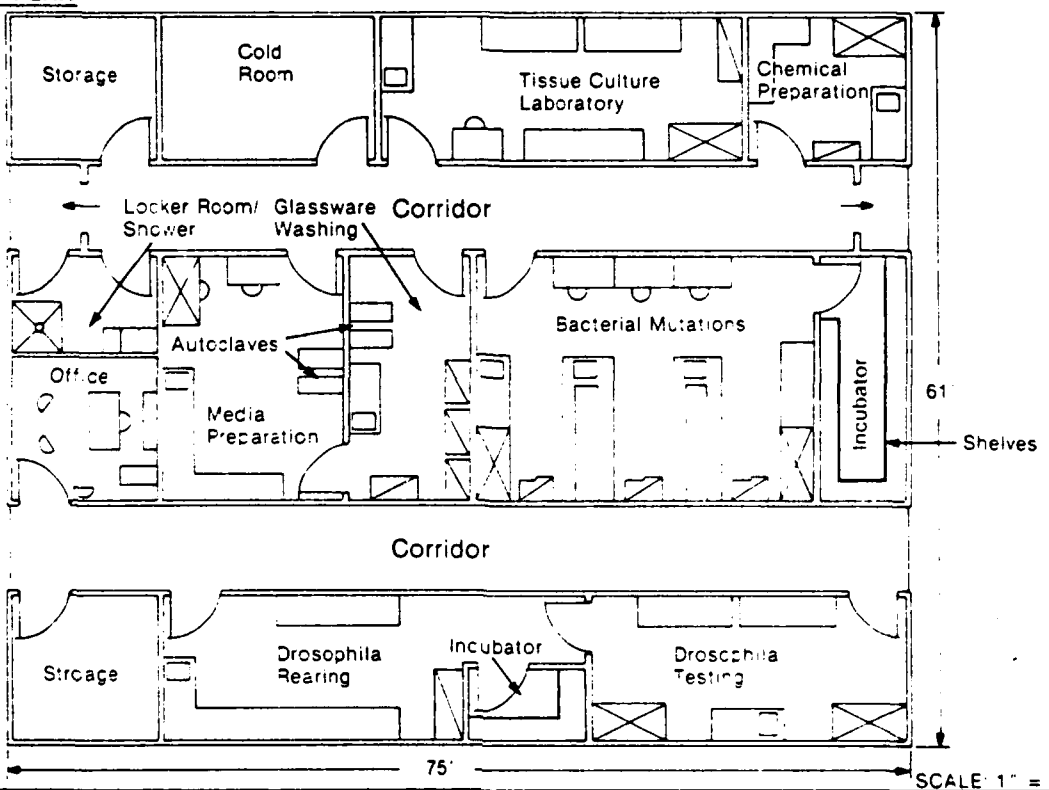
NO. 61

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



CONSTRUCTION INFORMATION

Dimensions: 75 x 61 Ft.
Area: 4,575 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 4,800 CFM ☐ Variable
Air Changes Hour: 7
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☐ Yes ☒ No
Local Exhaust Filtration: ☒ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air: ☐ Vacuum: ☐ Other Gases
☒ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

1. Laboratory arrangement minimizes possibility of contaminating tissue storage cold room.
2. Local glassware washing area provided to deal with large quantity of glassware used.

SPECIAL ASSUMPTIONS

Submammalian mutagenicity tests will be required in screening tests and tier approaches for planning and prioritizing mammalian toxicology test programs.

COST ESTIMATE

	Total $(000)	Resulting $ Sq. Ft.
General Construction	114	25
Heat, Vent, Air Cond	73	16
Electrical	87	19
Sanitary	37	8
Equipment	170	37
Total	481	105

TITLE

In Vitro Genetic Toxicology Studies Area

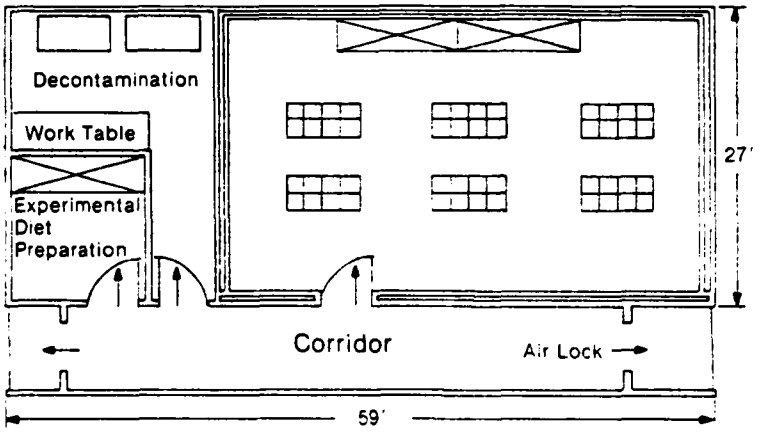
NO. 62

F-650 (2/15/81)

MAMMALIAN TOXICOLOGY FACILITY MODULE DESCRIPTION

Life Systems

FLOOR PLAN



SCALE: 1" = 15'

CONSTRUCTION INFORMATION

Dimensions: 59 x 27 Ft.
Area: 1,593 Sq. Ft.
Ceiling Height ☐ 8' ☒ 9' ☐ 13' ☐ _____
Air Flow: 3,600 CFM ☐ Variable
Air Changes/Hour: 15
Floor Drains: ☒ Capped ☐ Flushing ☐ Other
Water: ☒ Hot ☒ Cold ☐ None ☐ No ☐ Make-up
Central Vacuum Cleaning: ☒ Yes ☐ No
Local Exhaust Filtration: ☒ ☐ Yes ☐ No
Epoxy Coated: ☒ Walls ☒ Floors ☒ Ceilings
Sprinklers: ☐ Yes ☒ No ☐ Halon ☐ Optional
☐ Timed Lighting
☐ Compressed Air; ☐ Vacuum; ☐ Other Gases
☐ Emergency Shower/Eye Wash

SPECIAL FEATURES/BENEFITS

Compatibility with highly hazardous tests:
- Local diet preparation
- Local decontamination

SPECIAL ASSUMPTIONS

In vivo mutagenic studies using rodents will be used to screen chemicals and prioritize testing programs.

COST ESTIMATE

	Total $(000)	Resulting $/Sq. Ft.
General Construction	40	25
Heat. Vent., Air Cond.	25	16
Electrical	30	19
Sanitary	13	8
Equipment	83	52
Total	191	120

TITLE

In Vivo Genetic Toxicology Studies Area

NO. 63

F-650 (2/15/81)

DISTRIBUTION LIST

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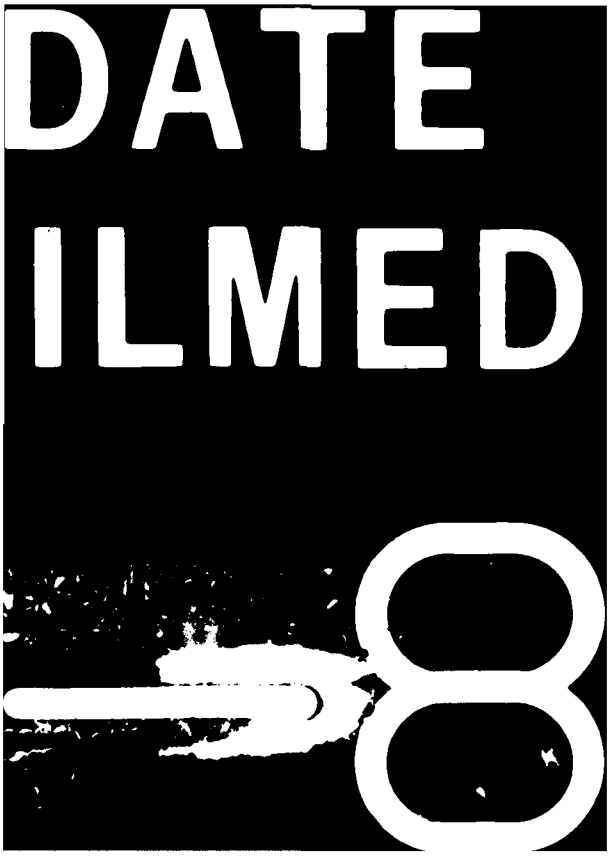
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